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NOTE.—The publications of the United States Department of Agriculture may be purchased from the Superintendent of Documents, Washington, D. C., to whom all remittances should be made. The price of *Experiment Station Record* is $1 per volume, and there will be two volumes each year. The prices of other technical publications are given above. The publications of the state experiment stations are distributed from the stations and not from the Department.

EXPERIMENT STATION RECORD.

Vol. XXII. January, 1910. No. 1.

The last International Stock Exposition, reported on another page of this issue, brought to a close the first decade of a notable enterprise for the encouragement of animal industry. As an educational event it has been fully appreciated by the progressive stockmen of the country, especially by those who live in the Central States, and as a great show it has stimulated interest in this industry far beyond expectation. It has increased in size from year to year, and its effect on quality has been shown in the higher standards of succeeding exhibits.

The primary object of this exposition is to encourage and improve the breeding and feeding of live stock for well-defined practical purposes, and up to the present time it has met with extraordinary success in accomplishing this object. To take a comprehensive view of the large collection of animals is an inspiration; the opportunity to inspect the superior types at close range is a temptation to all lovers of stock to go and do likewise. Year by year the various classes of stock have steadily improved. The International has undoubtedly been an important factor in this country in raising the standard of breeding, feeding, and methods of judging.

It was an important step in advance when the exhibitors in the fat cattle division and short-fed specials were required to furnish a statement of the feeds used and method of feeding employed in the production of their exhibits. From the standpoint of the managers of the show it may not be advisable to require more data on feeding and breeding from the exhibitors, but the educational value of the show would be increased by such a showing. It is a fine art to produce finished animals in the form and condition of many of the prize animals, but the finish should be made economically. The attainment of the perfect type by feeding cream and eggs contributes little to science and nothing to the economics of agriculture.

In addition to the special exhibition of animals, the student of animal husbandry has an excellent opportunity to increase his store of knowledge by observing the customary business activities of stock yards and meat-packing plants in the vicinity, which occupy a square mile of ground and give employment to over half a million of

Chicago's population. Then there is the dressed-carcass exhibit, which is instructive to those who have studied the live animals and their rating. Unfortunately this exhibit is seen by only a few people, owing to its inaccessibility. One who attends the show for the first time must make many inquiries and submit to other inconveniences in order to view it. There would seem to be opportunity for improvement in this respect.

The influence on the improvement of live stock which results from the rivalry of public exhibitions is apparent in the changes in animal types wherever such exhibitions have been held. The fat stock show had its origin in Great Britain, in connection with fairs where stock had been assembled at convenient centers for purposes of sale. Eventually breeders often claimed in advance that they would have for sale the best individual animals or herds, and backed their claims by offering money stakes. A judge would be appointed and the verdict given at the fair.

For a long time these fairs were local, but they became of general interest toward the latter half of the eighteenth century. The results of these and other similar events, like the Holkham and Woburn sheep shearings, were known far and wide. On the organization of the Smithfield Club one hundred and eleven years ago, the fat stock show became a national event, and led to the improvement of live stock in Great Britain as in no other country. The showing of the fat stock is preliminary to the sale, so that the practical element is kept constantly in view. The possibilities of early maturity is one of the more important lessons which have been learned from the fat stock shows. The improvement of the breeding classes is a more difficult problem, but even here the influence of the exhibitions, like those of the Smithfield Club and the International, may be seen by referring to the types of ten years ago.

One very important influence of the International has been in connection with the agricultural colleges, especially of the central West. These institutions have been conspicuous in the show ring and on the list of judges. Their success in training and supplying expert judges, and in feeding animals for exhibition, has revealed their practical character and the practical value of their courses.

The International has been a common meeting ground for practical stockmen and the alleged theorists of the agricultural colleges. It has been a potent agency in popularizing the colleges and winning the respect and confidence of practical men. At first practical breeders and feeders were skeptical, and held that the professors of agriculture could theorize but were unable to put their theories into practice. It was time for the professor of agriculture to show what he could do, and he has "made good." He has gone into the open market, bought, bred, fed and fitted for the show animals that have

not only won prizes but championships and grand championships year after year. A leading stock paper, in speaking of the last show, says:

"The agricultural college is fairly dominant in the meat-making sections. They practice what they preach. . . . Facing the achievements of the past few years in the International arena, no critic raises a note against the practical ability of the college force in the breeding and feeding of meat-making animals. This fact alone is worth all the International has cost, as it establishes on impregnable foundations an agricultural education as expounded at the land-grant colleges."

That the educational value of the International is appreciated by the colleges is attested by the attendance of both teachers and students in large numbers. This year delegations of students were sent from at least sixteen colleges, Missouri leading the list with three hundred and ninety-five men.

The exhibition of live stock, not only at the International but at state shows, has been in the nature of a necessity during a certain stage in the evolution of the agricultural college. But the time has come when it is a debatable question in some of the colleges whether they should not withdraw from prize contests and confine their exhibits, if made at all, to animals shown for educational ends solely, eliminating entirely the competitive feature.

This is a question for each college to decide for itself. In some States it may not be necessary longer to demonstrate the importance of the college to the agricultural community, but in many places such evidence of the practical character of the institution is helpful in winning the cooperation of the farmers, and the exhibits themselves have an educational value. In all cases, however, the spirit of commercialism and shrewd competition should be absent, and the plain effort should be to educate the people by furnishing illustrations of the application of scientific principles to the practical affairs of breeding and feeding.

The past twenty-five years has witnessed great improvement in the judging of live stock. There is a relation of external form to function and to the value of the dressed carcass. This is illustrated by the gradually closer agreement between the ratings of animals on the hoof and on the block in the slaughter tests at the International.

Until lately the study of the conformation of animals has been extremely superficial, but recently, both in this country and in Europe, investigations have been reported which show that the relation of form to function in domestic animals has taken on a more serious aspect. For instance, at the Missouri Station the changes taking place in the body conformation of steers when kept on maintenance

and submaintenance rations furnish an illustration of this relationship. Full-fed steers were found to increase in height more rapidly than those on a maintenance ration. Bones were found to increase in length, and fat was resorbed when the weight remained stationary. It is on the results of investigations like these that the stockman must base his practical work. In the past the feeder has too often been governed largely by empirical rules, and the breeder has relied upon his ability as a judge of exterior form to improve his stock. The latter must be able to look beneath the surface in making his selection, and both must understand the laws which govern the growing organism from the early stages of development to maturity.

Breeders and feeders are artists who work with living plastic materials. Their art, like that of those who work in clay and oil, is more the product of knowledge and ideals than of manual skill. As the painter knows the properties of the different pigments which he uses, so the breeder and feeder must know the properties of the feeds he uses, and the laws of the animal body as respects inheritance and responsiveness to feed and treatment.

Knowledge is a greater factor in the molding of living forms than in manipulating inert matter. Material composed of wood, metal, or clay becomes a work of art by the harmonious working of hand and brain. The creation of plant and animal types is dependent very largely upon a knowledge of the laws which govern the transmission of characters and the growth and development of living things. The ideal animal types of the future must be attained with the aid of principles discovered by the patient research of the physiologist and biologist. Here as elsewhere the improvement of agricultural practices of the future must be founded on the investigation of the present.

The American Society of Animal Nutrition, whose first annual meeting was held in connection with the International show, bids fair to be an efficient agency for promoting investigations of the more fundamental principles which underlie the arts and practices of animal industry. A brief account of this first regular meeting is given elsewhere (p. 97).

This society had its origin at an informal meeting of investigators in animal nutrition during the session of the Graduate School of Agriculture at Cornell University, in 1908. At that time a committee was appointed to consider the desirability of forming a permanent organization, which made a favorable report at the second meeting, held in Chicago, in November, 1908. The society accordingly was organized, with thirty-two members representing eighteen state colleges and experiment stations and the U. S. Department of Agriculture. Its avowed purpose is "to improve the quality of inves-

tigation in animal nutrition, to promote more systematic and better correlated study of feeding problems, and to facilitate personal intercourse between investigators in this field." All persons engaged in investigation or instruction in animal nutrition and related subjects in the United States and Canada are eligible to membership.

It augurs well for the society that at the first annual meeting the membership had more than doubled since its organization, and thirty-three States were represented. Although there were only a few papers read, the society was fairly launched and the way prepared for an important series of deliberations.

The principal paper was the address by the president, Dr. H. P. Armsby, upon The Food Supply of the Future. In this he departed from the usual statistical and economic treatment, and dealt with the relation of the animal feeder in conserving and utilizing more efficiently the supply of food materials. The new point of view in this presentation is an interesting and important contribution to the discussion of future food supply, which has recently been such a popular theme. The address furnishes a strong argument for thorough-going investigation in animal nutrition, and for a different kind of feeding experiments.

The problem of food supply, Dr. Armsby said, is essentially a problem of energy supply, the ultimate source of which is the sun. Food represents the stored-up energy of the sun's rays, and the density of population which a country can support from its own resources is limited absolutely by the amount of solar energy which can be recovered in the form of food products. It was shown that the larger part of the energy stored in an acre of crop is contained in inedible products. Thus, from one-half to two-thirds of the organic matter of the corn crop is contained in the stover and cobs, and about 60 per cent of that of the average wheat crop is in the straw.

In the milling of wheat to prepare it for man's use, about 25 per cent of the grain passes into the offals, and only 75 per cent serves for purposes of human nutrition. In other words, out of the total energy stored up by the growth of an acre of wheat, only about 30 per cent serves directly for the nutrition of man. Substantially the same thing is true in greater or less degree of other food crops.

The loss of human food in converting grains into meat was said to be even more wasteful. In support of this, figures were cited from Jordan to the effect that in the production of beef or mutton less than 3 per cent of the digestible organic matter in the feed is recovered as human food in the edible portion of the carcass, and in the case of pork only about 15 per cent.

"We can not continue indefinitely to use edible grains as stock food—the waste of energy in the transformation is too great. . . . The feeder of the future will utilize by-product feeds to an extent as

yet unrealized. . . . As the demand for food grows more intense, it will become increasingly important to so husband these by-products and combine them into efficient rations, and to feed these rations under such conditions and to such types of animals, as to save the largest possible percentage of the energy which they contain."

This furnishes the germ of the new line of effort. We are not only far from utilizing the various by-products to the greatest advantage, but we are feeding human food to live stock, and in this roundabout conversion of grain into human food through the animal are following a process demonstrated to be very wasteful. Up to the present time our experiments have aimed to show how grain might most efficiently be converted into meat, rather than how much of it might be saved for man's direct use; "we shall soon have to reverse the point of view," and this will call for a gradual revolution in agriculture and particularly in the production of animal foods, requiring a much higher degree of skill in adapting means to ends than has been necessary in the past.

With respect to their attitude toward the problem of the future food supply, it was pointed out that the experiment stations must take up in earnest the conservation rather than the exploitation of food resources, and the agricultural colleges, while still teaching the approved practices of the present, must as their chief aim seek to equip their students with a sound knowledge of underlying facts and laws, and thus prepare them to meet the changing conditions of the future. Such an attitude toward the subject of animal husbandry and such methods of teaching, it was suggested, will serve to impart to it a higher pedagogic value than it generally has at present, and will tend to make it a disciplinary as well as an informational subject.

To prepare for the future, Dr. Armsby urged that there should be "a far more extensive and profound study of the scientific principles of animal nutrition than has yet been made," and he presented the reasons and need for such investigation with unusual clearness. He said:

"That he may utilize the materials of which I have been speaking as completely as possible, the stockman needs to know in the first place what proportion of the energy which these various materials contain it is possible or practicable to recover. This knowledge will enable him to effect a wise selection in the compounding of rations, as well as have an influence upon the whole system of farming. In the second place, he needs to know the relative efficiency of different species, breeds, and types of animals as converters of energy, and how their efficiency is influenced by their natural or artificial environment.

"These, however, are questions of animal physiology. In effect they ask how does the animal mechanism operate when supplied with different raw materials or placed under varying conditions. They are problems for rigorous scientific research and too much stress can not be laid upon the importance of such research."

Another main line of experimental effort suggested relates to the economic application in practice of the principles discovered by investigation—a wide field for fruitful experimental work; and here especially a coordination of effort and of opportunity was regarded as highly important.

In papers by Dr. F. G. Benedict, of the Carnegie Institution, and Dr. C. F. Langworthy, of this Office, timely suggestions were made for the study of the protein requirement of animals, the relation of protein to carbohydrates, and the influence of mineral matter. These large problems were thought to present good opportunity for coordinate action or cooperation by stations working under different conditions of feed supply and environment. The possibility of using small animals, which complete their life cycle in a short period, was suggested as a means of getting data on some points associated with the relation of food to growth, in a preliminary way.

Taken as an introduction to the new society, the papers presented at its first meeting are so suggestive as to give promise of a career of great usefulness in directing thought and action in the field of animal feeding. The society, as Dr. Armsby said, owes its origin largely to a feeling of dissatisfaction with the more or less fragmentary and elementary nature of feeding studies in the past, and is the embodiment of a desire on the part of investigators for closer relations with each other and a more broadly conceived programme of investigation. As a foundation for this the beginning was most propitious.

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

Concerning protein, E. PFLÜGER (*Arch. Physiol.* [*Pflüger*], *129* (*1909*), *No. 1–2, pp. 99–102*).—The author discusses recent work on the cleavage products of protein and cautions against drawing sweeping deductions from available data.

The leucin fraction of proteins, P. A. LEVENE and D. D. VAN SLYKE (*Jour. Biol. Chem.*, *6* (*1909*), *No. 5, pp. 391–418*).—According to the authors' experiments, "l-leucin and d-isoleucin may be separated quantitatively from d-valin by precipitation as the normal lead salt, Pb ($C_6H_{12}O_2N_2$). The relative proportions of the leucin isomers may be determined polarimetrically by the rotation of their analytically pure mixture in 20 per cent hydrochloric acid. An exact analysis of the important leucin fraction of proteins is thus rendered possible for the first time. . . . Isoleucin preparations from casein and edestin showed, after repeated purification by means of the lead and copper salts, and by recrystallization, specific rotations of + 37.35° and + 37.44°, respectively, in 20 per cent hydrochloric acid."

The leucin fraction in casein and edestin, P. A. LEVENE and D. D. VAN SLYKE (*Jour. Biol. Chem.*, *6* (*1909*), *No. 5, pp. 419–430*).—Determinations of leucin, valin, and isoleucin from casein and edestin are reported in comparison with earlier work.

On the partial hydrolysis of edestin, Z. H. SKRAUP and A. WÖBER (*Monatsh. Chem.*, *30* (*1909*), *No. 3, pp. 289–309*).—From 100 parts of edestin the author obtained 22 parts of acid precipitate (protalbin acid), and 72 parts of albumose (lysalbin acid), 30 parts being peptone (lysalbin peptone). The last two contained ammonium sulphate as an impurity.

Electrolysis of iron pipe, F. P. SIEBEL (*Ice and Refrig.*, *37* (*1909*), *No. 4, pp. 116–119, figs. 4*).—Iron pipes, when immersed in water of good purity and free from *Leptothrix ochracea*, pitted more readily upon the passage of an electric current. Pipes containing a low amount of carbon corroded much more quickly than those with a high carbon content, but according to the author, the amount of carbon in a metal does not altogether control the condition but rather the distribution of the carbon particles and whether it is present in the free or combined state. Cast irons containing much silicon are also readily decomposed.

Contributions to micro-chemical analysis, N. SCHOORL (*Ztschr. Analyt. Chem.*, *48* (*1909*), *No. 10, pp. 593–611*).—This further contribution to the subject (E. S. R., 21, p. 702) treats of magnesium, lithium, potassium, and sodium.

Nessler's reagent, A. SCHNEIDER (*Pharm. Zentralhalle*, *50* (*1909*), *No. 26, p. 546; abs. in Chem. Ztg.*, *33* (*1909*), *No. 99, Repert., p. 429*).—The author calls attention to the fact that frequently Nessler's reagent prepared according to different methods gives no reaction with ammonia, and attributes this to the absence of mercuric iodid which has been removed by filtration.

A new acidimetric method employing lime water, A. DE GREGORIO ROCASOLANO (*Rev. R. Acad. Cien. Madrid, 7 (1908), No. 6, pp. 375–382, figs. 2; abs. in Chem. Ztg., 33 (1909), No. 89, Repert., pp. 386, 387*).—The volumetric limewater solution method can be employed for hydrochloric, sulphuric, nitric, phosphoric, oxalic, citric, and tartaric acids. The solution, prepared by saturating water with lime, is siphoned off through a filter paper or membrane attached to the proximal end of a wide bored siphon, and the siphon is in turn connected with a burette. At each reading of the burette the temperature of the solution must be taken and compared with a table appended by the author. The general formula for calculation is also given.

The accuracy of the Volhard method for the determination of chlorin, V. ROTHMUND and A. BURGSTALLER (*Ztschr. Anorgan. Chem., 63 (1909), No. 4, pp. 330–336*).—According to the authors the Volhard method without filtering off the silver chlorid is only accurate when rather large amounts of chlorid are present and the solution is not too dilute. The addition of an excess of silver nitrate has a favorable influence upon the reaction, but an excess of thiocyanate solution must be avoided in titrating back.

Aluminum as an impurity in barium sulphate precipitate, H. J. M. CREIGHTON (*Ztschr. Anorgan. Chem., 63 (1909), No. 1, pp. 53–58, fig. 1*).—The presence of small amounts of aluminum salts in a solution has a tendency to increase the weight of the barium sulphate precipitate.

A new method for the rapid determination of phosphoric acid in alkaline phosphates, M. E. POZZI-ESCOT (*Bul. Assoc. Chim. Sucr. et Distill., 26 (1909), No. 12, pp. 1162, 1163*).—The method is a volumetric one and consists in taking 10 cc. of the phosphorus solution, adding 2 drops of a 0.2 per cent solution of helianthine and 5 drops of a 1 per cent solution of phenolphthalein, and then just so much dilute sulphuric acid as will give the solution a reddish tint. The color of the solution is brought back to yellow, which is the neutral point of the helianthine, by the addition of soda solution, and then titrated with tenth-normal alkaline solution until the pink tint is obtained. Each cubic centimeter of the tenth-normal alkaline solution employed is equivalent to 0.0071 gm. phosphoric acid.

Moisture discrepancies in phosphate rock of the Pacific, C. C. JAMES (*Jour. Indus. and Engin. Chem., 1 (1909), No. 9, pp. 657–659*).—Phosphate rock when ground for analysis shows a perceptible loss in moisture. Tests were made to demonstrate this. Stress is laid upon the proper selection of representative samples.

Limitations of starch as an accelerator, C. K. FRANCIS (*Jour. Indus. and Engin. Chem., 1 (1909), No. 9, pp. 678, 679*).—In a soil analysis it was found that the blank containing starch and sodium peroxid gave the same percentages of phosphorus as some of the soil samples. An examination of several samples of starch revealed a phosphoric acid content, ranging between 0.169 and 0.036 per cent. The author has substituted sugar for starch in this work.

The determination of phosphoric acid in metabolism experiments by the Neumann method, H. SCHAUMANN (*Ztschr. Analyt. Chem., 48 (1909), No. 10, pp. 612–617, figs. 3*).—A description of Neumann's method as employed by the author in metabolism work is given. The filtering apparatus used is shown.

The determination of phosphorus in flesh, P. F. TROWBRIDGE (*Jour. Indus. and Engin. Chem., 1 (1909), No. 9, pp. 675, 676*).—With 72 samples of flesh the percentage of phosphorus by ashing was 0.0028 higher on an average than that obtained by digestion with sulphuric acid.

Handbook of biochemical methods, E. ABDERHALDEN (*Handbuch der biochemischen Arbeitsmethoden. Berlin and Vienna [1909], vol. 1, pt. 1; rev. in*

Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. ser., 4 (1909), No. 17, pp. 687, 688).—A digest of data regarding biochemical methods designed for laboratory use.

A contribution to the biological differentiation of proteids, W. Rickmann (*Ztschr. Fleisch u. Milchhyg., 17 (1907), No. 6, pp. 197–201; abs. in Ztschr. Untersuch. Nahr. u. Genussmtl., 18 (1909), No. 3, p. 220*).—The author investigated the precipitin reaction and the deviation of complement in regard to their sensitiveness in differentiating human from hog proteids. He found that the presence of 0.00001 cc. of human serum completely checks the hemolysis, whereas in the presence of 0.1 cc. of hog serum hemolysis continues, so that a specifity of 1 to 10,000 exists. With the precipitin reaction the specifity was only 1 to 100. The deviation of the complement method is recommended to be run in parallel with the precipitin reaction.

The Bang method for the determination of sugar, H. Jessen-Hansen (*Compt. Rend. Lab. Carlsberg, 7 (1909), No. 4, pp. 218–226; abs. in Chem. Ztg., 33 (1909), No. 97, Repert., p. 418*).—This is a critical study of the Bang method for determining sugar, which the author considers the best method known for the purpose. Special attention is called to the method employed in mixing the solutions which go to make up the principal solution in order to obtain the proper concentration. The rapidity with which the white solution is added is also of great moment. The rate recommended is 20 cc. in 15 seconds, and the temperature for the titration 32° C. The space occupied by the solution has a definite effect on the results.

Color reactions for sugars with the indol bodies, J. Gnezda (*Compt. Rend. Acad. Sci. [Paris], 148 (1909), No. 8, pp. 485–489; abs. in Bul. Soc. Chim. France, 4. ser., 6 (1909), No. 15, p. 840*).—This reaction is based upon the production of a blue, brown, or green precipitate by the methylindols in alkaline solutions of sugars containing the group CHO upon acidification with HCl.

The detection of saccharose and calcium sucrate, particularly in milk, S. Rothenfusser (*Ztschr. Untersuch. Nahr. u. Genussmtl., 18 (1909), No. 1–2, pp. 135–155*).—The reagent employed consists of 20 cc. of a 5 per cent alcoholic solution of diphenylamin, 60 cc. of acetic acid, and 120 cc. of 1 : 1 hydrochloric acid. Saccharose gives a blue coloration with this reagent. Lactose does likewise, but less rapidly.

With milk it is necessary to precipitate as much as possible of the lactose and other substances. This is done by adding a solution consisting of 2 parts by volume of lead acetate solution (German pharmacopœia) with 1 part by volume of 10 per cent ammonium solution, to an equal volume of the milk or cream, shaking well and filtering. From 3 to 4 cc. of the filtrate are then mixed with double the amount of the diphenylamin reagent and placed in the boiling water bath. In about 2 to 3 minutes a blue color appears if saccharose is present to the extent of 0.05 per cent.

The estimation of the ash in sugars and sirups by the determination of the electrical conductivity, H. Main (*Internat. Sugar Jour., 11 (1909), No. 127, pp. 334–339, fig. 1*).—Determining the conductivity of the ash solution by Kohlrausch's apparatus, with some modifications, is a convenient method for industrial work.

The direct gravimetric determination of starch according to the method of Baumert and Bode, G. Baumert (*Ztschr. Untersuch. Nahr. u. Genussmtl., 18 (1909), Nos. 1–2, pp. 167–168*).—Various influencing factors have been eliminated and hydrochloric acid is now used in this method.

A comparative study of the titrimetric and polarimetric methods for the determination of starch, Anna Giltay and J. J. Blanskma (*Pharm. Weekbl., 46 (1909), No. 27, pp. 689–710*).—A critical study of these methods for the

determination of starch. Among the titrimetric methods that of Sachsse is to be given preference. No definite conclusion could be drawn for the polarimetric method.

A rapid method for hydrolyzing starch, G. A. OLSON (*Jour. Indus. and Engin. Chem., 1 (1909), No. 7, pp. 445–447; abs. in Chem. Ztg., 33 (1909), No. 103, Repert., p. 446*).—Owing to the length of time required in the Sachsse method the author proposes the following, which can be done in 4 minutes: Place 1 gm. of the finely ground sample in a 500 cc. Kjeldahl flask with 10 cc. of distilled water, add 6 cc. of concentrated sulphuric acid (specific gravity 1.84), and heat with shaking over the free flame until the solution is transparent. Then add 10 to 15 cc. of distilled water, heat with shaking until the mixture boils, cool, neutralize with sodium hydroxid, transfer to a 250 cc. flask and fill to the mark with water. Determine dextrose in aliquot.

The estimation of starch in feeds and foodstuffs, A. SCHOLL (*Ztschr. Untersuch. Nahr. u. Genussmtl., 18 (1909), No. 1–2, pp. 157–166*).—In the analysis of potatoes for starch content by the Lintner and Ewers method the author found considerable difficulty in clarifying the solution with phosphotungstic acid. A method is described which eliminates the phosphotungstic acid from the process. The method is recommended for feeds and foodstuffs in general.

The indirect determination of alcohol in raspberry sirup, E. GÜNZEL (*Ztschr. Untersuch. Nahr. u. Genussmtl., 18 (1909), No. 3, pp. 206–211*).—Determining alcohol indirectly by the specific gravity without diluting gives higher results than those obtained by the distillation method. If, however, both the original and the dealcoholized sirups are diluted the results agree well with the distillation method. Diluting the portion to be dealcoholized and employing the original undiluted does not give good results.

The determination of volatile organic acids in tobacco, R. KISSLING (*Chem. Ztg., 33 (1909), No. 79, pp. 719, 720*).—This is a criticism of Tóth's method for determining the volatile organic acids of tobacco and an answer to Tóth in reference to the volatilizing of oxalic acid.

The value of the nitrate reaction in milk, S. ROTHENFUSSER (*Ztschr. Untersuch. Nahr. u. Genussmtl., 18 (1909), No. 6, pp. 353–363*).—The author concludes from a large series of tests with milk and water from known sources and milk purposely polluted with nitrates, that the nitrate reaction is a very valuable means to judge milks from a sanitary standpoint, and that it is possible to detect by this method milks of poor quality having a small addition of water. The author made some 300 barn tests of milk and found in no instance either a nitrite or nitrate reaction. Milk from pastured animals also did not give the nitrate reaction.

The estimation of the dirt content of milk, H. WELLER (*Ztschr. Untersuch. Nahr. u. Genussmtl., 18 (1909), No. 5, pp. 309–313*).—A criticism of the method of Fendler and Kuhn and the standard established by them. Examples are presented to show that the Weller method is more reliable.

The influence of heating upon butter fat, A. BEHRE (*Pharm. Zentralhalle, 50 (1909), No. 8, p. 158; abs. in Ztschr. Untersuch. Nahr. u. Genussmtl., 18 (1909), No. 3, pp. 233, 234*).—In butter fat which was heated for 3 hours for the removal of water over an open flame the acidity ran between 3.5 and 3.75. The Reichert-Meissl number at the beginning was 27.06 and at the end 27.44. The saponification number at first was 226.2 and finally 227.1. It is evident from these figures that heating causes no appreciable change in these constants.

The Polenske method for the detection of animal fats in a mixture of other animal fats, L. LABAND (*Ztschr. Untersuch. Nahr. u. Genussmtl., 18 (1909), No. 5, pp. 289–299*).—The author concludes that the Polenske method (by difference between the melting and solidifying points) is only applicable

for the detection of foreign fats in butter when the other constants deviate equally from the normal figures. With butters which have a medium or a high saponification value and Reichert-Meissl figure, and also a high difference number, it only has a limited value. The method is deemed valuable for the detection of bovine fat in lard, but it must be carried out in accordance with the author's directions.

About melting point determinations, H. Güth (*Pharm. Zentralhalle, 49 (1908), No. 37, pp. 739–741; abs. in Ztschr. Untersuch. Nahr. u. Genussmtl., 18 (1909), No. 5, p. 326*).—Comparative tests with the melting-point method as described in the German pharmacopœia and that described by Polenske showed that the two methods give different values.

The value of the oil of sesame reaction, L. Hoton (*Ann. Falsif., 1 (1908), No. 2, pp. 65–67*).—A discussion of the furfurol reaction with sesame and olive oils from various sources.

The comparative examination of the halogen absorption of oils by the methods of Hubl, Wijs, Hanus, and McIlheney, J. S. Remington and N. Lancaster (*Pharm. Jour. [London], 4. ser., 29 (1909), No. 2389, pp. 146, 147; abs. in Jour. Soc. Chem. Indus., 28 (1909), No. 16, p. 892*).—The McIlheney bromin method is deemed much better than any of the other 3 methods, as the absorption is almost instantaneous and the solutions can be easily prepared. The Wijs method gave better results than the Hubl and Hanus methods, and was most accurate and rapid when there was an excess of 70 to 80 per cent of halogen. The maximum absorption was obtained in 2 hours with linseed oil and in ½ hour with nondrying oils. Semidrying oils required 1 hour.

A short handbook of oil analysis, A. H. Gill (*Philadelphia and London, 1909, 5. ed., rev. and enl., pp. 179, figs. 6*).—In this revised and enlarged edition those portions dealing with the detection of animal and vegetable oils, the treatment of unsaponifiable matter, and the turpentines have been entirely rewritten. A new chapter upon waste fats and oils has been added.

Report on the work of the agricultural experiment station at the University of Jena. I, Agricultural-chemical division (*Ber. Landw. Vers. Stat. Univ. Jena, 1908, pp. 1–14*).—A report as to analyses made of fertilizers, feeding stuffs, milk and dairy products, the maximum, minimum, and average content of the various constituents being reported in some instances, with brief notes.

Report of Örebro Chemical Station and Seed Control Station, 1908, J. Widén (*Örebro Kem. Stat. och Frökontrollanst. Årsber. 1908, pp. 32*).—This is a summary of the results of work during the year.

[Analyses of koa and ohia bark and slum gum], Alice R. Thompson (*Hawaii Sta. Rpt. 1908, p. 62*).—Analyses of koa and ohia bark showed a tannin content of 19.91 and 5.73 per cent, respectively, calculated to dry substance. A sample of extracted slum gum was found to contain only 25.27 per cent of wax.

Italian lemons and their by-products. II.—The by-products of the lemon in Italy, E. M. Chace (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 160, pp. 35–50, pls. 3, figs. 2*).—This is a description of the various lemon-producing districts of Italy and of the methods of producing lemon by-products.

The methods of producing the essential oil of lemon by the two and three piece sponge methods and the machine method are described in detail. The machine method yields the best grade of oil. There are also descriptions of the treatment of the peel residue, which in most instances yields an inferior grade of oil, and of the manufacture of calcium citrate from the pulp juice. Data are given as to the cost of production of these by-products in comparison

with the prices paid therefor by the various essential oil and chemical dealers of the United States and Europe.

Denatured alcohol from tunas and other sources, R. F. Hare, S. R. Mitchell, and A. P. Bjerregaard (*New Mexico Sta. Bul. 72, pp. 5–52, pl. 1, figs. 5*).—This is a study, in cooperation with the Bureau of Plant Industry of this Department, of the possibilities of alcohol production from the tuna and closely related plants.

Comparisons are given between the yield of alcohol from corn, molasses, sugar, wheat, potatoes, and tuna fruits. The tuna has the advantage that it does not require a preliminary malting, as it contains no starch and can contain as much as 10 to 15 per cent of sugars, mostly dextrose. The actual yield of tunas per acre has not been commercially established, but the authors cite plat experiments in which a yield of 9 to 14 tons per acre was secured. With 10 tons per acre, sold at the rate of 15 cts. per 100 lbs., $30 could be secured per acre. The total cost of producing alcohol from tunas, aside from the initial cost of the distillery, will probably not be over 15 to 16⅔ cts. per gallon. The greatest difficulty encountered has been the time consumed by the picking process, and some more rapid method must be devised before the industry can be made profitable.

Laboratory fermentation tests showed that it was possible to ferment as much as 92 per cent of the total sugars of the tuna. These tests were conducted with the minced pulp and the juice of the tuna. The results were not altogether favorable to preliminary sterilization, though the yield, and probably the profit, is increased thereby. Various stimulants and accelerators for the fermentation were employed, and it was noted that the Pasteur nutrient fluid failed to show any results at all, whereas on the other hand manganese salts seemed to increase the yield slightly. It is necesary to employ pure species of yeast for this fermentation.

Sterilization of canned goods, E. W. Duckwall (*Canner and Dried Fruit Packer, 29 (1909), No. 8, pp. 26, 28, 30, figs. 2*).—A popular article, giving concrete examples of the proper and practical methods of sterilization of canned goods.

Cause of cloudy liquor on peas, E. W. Duckwall (*Canner and Dried Fruit Packer, 29 (1909), No. 1, pp. 34, 36*).—An examination of the liquor showed that the cloudiness is produced by the starch from the peas. The direct cause is overheating.

Pure yeast selection and control, L. Musso (*Bul. Agr. Algérie et Tunisie, 15 (1909), No. 17, pp. 389–395*).—The author describes the methods of pure yeast control and the selection of the desired species, and reports 21 fermentation tests, in which the sugar fermented, alcohol produced, degree of fermentation, and organoleptic test (bouquet, etc.) were noted.

The nomenclature of the lactic-acid bacteria, A. Wolff (*Centbl. Bakt. [etc.], 2. Abt., 24 (1909), No. 1–4, pp. 55–58*).—A polemical article in which is pointed out the vast differences which exist in the morphological and physiological classifications of the various organisms classed among the lactic-acid group, with special reference to certain names given by various investigators.

Proposals for the nomenclature of the Lipoids, O. Rosenheim (*Bio-Chem. Jour., 4 (1909), No. 8, pp. 331–336; abs. in Chem. Ztg., 33 (1909), No. 69, p. 623*).—It is recommended that the nomenclature of those bodies which are in the cholesterin group, the cerebro-galactosids, and the phosphatids be arranged in 3 groups as follows: Those which contain neither phosphorus nor nitrogen; those which are free from phosphorus but contain nitrogen; and finally, those which contain phosphorus and nitrogen.

A cold-storage evaporimeter, M. M. Hastings (*U. S. Dept. Agr., Bur. Anim. Indus. Circ. 149, pp. 8, fig. 1*).—A practical apparatus for determining the humidity in cold-storage houses which store cheese, eggs, etc., is described. The principle of the apparatus is the same as that recommended by Livingston of the Carnegie Desert Laboratory (E. S. R., 18, p. 328). The substance employed therein, however, is a dilute sulphuric-acid solution which, like other substances of the same nature, has a certain more or less definite equilibrium vapor pressure at which absorption and evaporation equalize each other.

Refrigeration and the cold-storage industry, U. Ferretti (*L'Industria del Freddo. Rocca San Casciano, Italy, 1909, pp. XI+445, figs. 251*).—This volume is an extended treatise on the cold-storage industry from the standpoint of agriculture, commerce, hygiene, horticulture, etc. Refrigerating machines, the production of artificial ice, food preservation, and other topics are considered.

A bibliography is appended to the volume.

METEOROLOGY—WATER.

Study of meteorology as a branch of agricultural science, W. R. Dunlop (*Agr. Gaz.* [*London*], *70* (*1909*), *No. 1855, p. 57*).—This is a brief article explaining the relation of the more common weather observations to weather prediction, and intended to encourage the giving of more attention to this subject by farmers.

Treatise on physical geography, E. de Martonne (*Traité de Géographie Physique: Climat, Hydrographie, Relief du Sol, Biogéographie. Paris, 1909, Nos. 1, pp. 204; 2, pp. 202, illus.; rev. in Rev. Gén. Chim., 12* (*1909*), *No. 14, pp. 255, 256*).—This treatise deals with climate, hydrography, physiography, and biogeography.

Effect of climate on crops, W. S. Palmer (*Proc. Dry Farming Cong., 3* (*1909*), *pp. 168–173, figs. 2*).—The climatic conditions in Wyoming are briefly summarized with reference especially to so-called dry farming.

Meteorological, magnetic, and seismic observations of the College of Belen of the Society of Jesus, Havana, 1907 and 1908, L. Gangoiti (*Observatorio Meteorologico, Magnetico y Seismico del Colegio de Belen de la Compañía de Jesus en la Habana, año de 1907, 1908. Havana, 1908, pp. 90, dgms. 3; 1909, pp. 97, dgms. 3*).—Detailed reports, largely tabular and diagrammatic, of the usual observations.

The climate of Buenos Aires in 1908 (*Yearbook City Buenos Aires, 18* (*1908*), *pp. 3–9*).—Observations on pressure, temperature, rainfall, humidity, sunshine, vapor pressure, and wind are summarized for each month of the year and for each 10-day period. Determinations of the amount of ozone, carbon dioxid, free and organic ammonia, and bacterial content of the air, and of organic and free ammonia and nitrous and nitric acid in rain water are also reported.

The weather during the agricultural year 1907–8, F. J. Brodie (*Jour. Roy. Agr. Soc. England, 69* (*1908*), *pp. 384–393*).—The general character of the different seasons in the United Kingdom is described and summary tables of observations on temperature, sunshine, and rainfall are given.

Meteorological observations (*Statis. Yearbook* [*Natal*], *1908, pp. 26–30*).—Tables give observations on pressure, temperature, rainfall, cloudiness, and wind during the period from 1885 to 1908 at Durban, and on temperature and rainfall during the period from 1894 to 1908 at a number of other places in Natal.

Report of the Meteorological Commission for the year ending December 31, 1908, C. A. Smith et al. (*Rpt. Met. Com.* [*Cape Good Hope*], *1908, pp.*

XII+53).—In addition to various administrative details, this report contains tabular summaries of observations on pressure, temperature, rainfall, sunshine and cloudiness, evaporation, and wind movement at various places in Cape of Good Hope.

Climate [of Japan], C. SHIMOOKA (*In Agriculture in Japan. Tokyo: Govt., 1908, pp. 27–38*).—The principal climatic features of Japan are briefly described in this article. It is pointed out that while the greater portion of the country is situated in the temperate zone and the whole country is surrounded by seas, which make the climate much milder than that of Manchuria, Siberia, and Korea, the facts that the country extends over 30 degrees of latitude and has a great variety of topographical conditions give rise to wide variations in climatic features.

On the extreme variations in rainfall, G. HELLMANN (*Ztschr. Gesell. Erdk. Berlin, 1908, No. 9, pp. 605–613; abs. in Ann. Hydrog. u. Marit. Met., 37 (1909), No. 4, pp. 183, 184*).—On the basis of observations on rainfall in different parts of the world, an attempt is made to formulate certain laws controlling the variations in rainfall and to determine variation quotients for different regions.

Percolation, evaporation, and condensation, B. LATHAM (*Quart. Jour. Roy. Met. Soc. [London], 35 (1909), No. 151, pp. 189–211, figs. 8*).—This article gives the results of observations with rain gages and percolating gages on chalk soils.

Each of the percolating gages was exactly one square yard in area and contained 1 cu. yd. of material. The edges of the gages stood about 1½ in. above the surface of the soil inside and outside of the gage. One gage was filled with chalk soil, the other with a gravel soil containing vegetable remains. The observations recorded began in 1878 and have been continued daily up to the present time. The amount and composition of the percolating waters and the evaporation as measured by standard evaporators are reported. The results are summarized in the following table:

Monthly average rainfall, percolation, evaporation, and condensation at Croydon for the 30 years 1879 to 1908.

Month.	Rainfall.	Percolation, chalk.	Percolation, gravel.	Evaporation, floating evaporator.	Condensation, floating evaporator.	Evaporation, exposed evaporator.	Temperature of water, floating evaporator, at 9 a. m.	Temperature of dew-point at 9 a. m.
	Inches.	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*°F.*	*°F.*
January	1.849	1.7095	1.6446	0.246	0.0608	0.743	36.15	34.45
February	1.854	1.6275	1.5150	.344	.0460	.994	36.86	34.81
March	1.733	1.2730	1.1346	.936	.0180	2.189	39.88	36.53
April	1.616	.5472	.3893	1.808	.0040	3.515	47.34	40.02
May	1.806	.4045	.2056	2.698	.0012	4.893	55.53	45.31
June	2.253	.4387	.3089	3.116	.0028	5.261	62.16	51.18
July	2.299	.3096	.2881	3.305	.0003	5.549	65.30	54.48
August	2.265	.3240	.2645	2.679	.0018	4.658	63.38	54.71
September	2.007	.1686	.1217	1.521	.0018	2.931	57.61	52.22
October	2.963	.9876	.9567	.825	.0378	1.554	49.26	45.75
November	2.612	1.4314	1.6811	.426	.0654	.893	42.79	40.96
December	2.199	1.6221	1.8324	.233	.1190	.670	37.75	35.93
Yearly average.	25.456	10.8437	10.3425	18.137	.3589	33.850	49.50	43.87

The nature and extent of air pollution by smoke, J. B. COHEN and A. G. RUSTON (*Abs. in Nature [London], 81 (1909), No. 2085, pp. 468, 469, figs. 2*).—This is an abstract of a paper read at the Health Congress at Leeds July 17, and gives the results of detailed examinations of samples of air taken at 10 representative stations in Leeds and one at Garforth about 7½ miles from Leeds.

"The impurities, in the form of suspended matter, consist of soot, tar, sand, mineral substances, and, in solution, of sulphurous and sulphuric acids or their salts, chlorids, largely in the form of hydrochloric acid or common salt, and nitrogenous matter, in the form of nitrates or free and albuminoid matter." Injurious effects of these substances on vegetation are discussed.

Water: Its origin and use, W. COLES-FINCH (*London, 1908, pp. 506; rev. in Chem. News, 99 (1909), No. 2565, p. 48*).—This book treats in an elementary way of the water of the atmosphere, rain, snow, ice, springs, and wells. Some account is given of different methods of obtaining water, sinking wells, the construction of waterworks, and the preparation of water for domestic use. The use of water for irrigation and for operating hydraulic machines is also briefly discussed.

Surface water supply of the South Atlantic coast and eastern Gulf of Mexico, 1907–8, M. R. HALL and R. H. BOLSTER (*U. S. Geol. Survey, Water-Supply Paper No. 242, pp. 226, pls. 3, fig. 1*).—This is part 2 of a series of bulletins on the Surface Water Supply of the United States, 1907–8, and gives the results of measurements of flow of streams in the drainage basins of the following South Atlantic and eastern Gulf of Mexico streams: James, Roanoke, Yadkin or Pedee, Santee, Savannah, Ogeechee, Altamaha, Satillo, St. Johns, Peace, Withlacoochee, Suwanee, Ocklockonee, Apalachicola, Choctawhatchee, Escambia, Mobile, Pascagoula, and Pearl rivers.

Underground water resources of Connecticut; a study of the occurrence of water in crystalline rocks, H. E. GREGORY and E. E. ELLIS (*U. S. Geol. Survey, Water-Supply Paper No. 232, pp. 200, pls. 5, figs. 31*).—This bulletin treats in some detail of the geography and geology of Connecticut; the occurrence and recovery of ground water; ground water in crystalline rocks, triassic sandstone and traps, and glacial drift; the water supply of typical areas; the general character of ground water in Connecticut; well construction; and springs.

A bibliography of literature bearing on the subject is also given.

Geology and underground waters of South Dakota, N. H. DARTON (*U. S. Geol. Survey, Water-Supply Paper No. 227, pp. 156, pls. 15, figs. 7*).—"This report is intended mainly to set forth the geologic conditions bearing on the occurrence of artesian waters in South Dakota. It comprises a description of the sedimentary rocks, a statement as to the results of all the deep borings which have been reported, and predictions as to the probable depths and area of flow of the deeper-seated waters in all portions of the State. The water resources for shallow wells are not considered except in areas where such waters afford flows." Suggestions are given regarding the construction and management of artesian wells.

Farm water supplies of Minnesota, K. F. KELLERMAN and H. A. WHITTAKER (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 154, pp. 87, figs. 73*).—This bulletin discusses briefly the increasing danger of pollution of water supplies with increasing population, classifies farm water supplies with reference to factors of pollution, describes the methods of collection and examination of water supplies used in the investigations reported, and gives a detailed account of the particular water supplies examined, including dug, bored, drilled, and driven wells, springs, rivers, surface reservoirs, and cisterns. The rural typhoid fever problem is also dealt with. The scope of the investigations was limited to a single State but covered a wide range of rural conditions. The results of the investigations are briefly summarized as follows:

"Both farm and city are suffering from the careless management of rural sanitation.

"Previous investigations of rural water supplies have been more or less unsatisfactory, due either to the local or fragmentary character of the investigations or to the use of a single method in studying the supplies in question.

"Exhaustive data upon 79 carefully selected and typical rural water supplies show that 20 were good and, usually because of careless or ignorant management, that 59 were polluted.

"Of the polluted wells, 11 are so located that even extreme care would not make them safe; 10 are poorly located, but improvements in the protection from surface wash and infiltration would make them safe; 25 are bad only because of poor surface protection and could easily be made safe; 1 is polluted from unknown, probably distant, sources. One spring supply is polluted because of poor surface protection and could easily be made safe. The rivers, surface reservoirs, and cisterns are polluted, and it is doubtful whether satisfactory supplies can be secured for farm use from such sources. Where their use is necessary, water for drinking should be boiled or otherwise disinfected.

"During this investigation 23 of the farms examined showed a record of typhoid fever. On 11 of these farms it was found impossible to locate the source of infection, on 2 farms possible sources were determined, while on 10 the data seemed to locate definitely the source of infection. The water supplies upon 5 of these farms were not polluted and the infection was traceable to outside sources; the water supplies of the remaining 18 farms were polluted.

"The protection of farm supplies by common-sense methods obvious to anyone who will try to discover the dangers incident to his own water supply would render safe the majority of the farm supplies which are now polluted. Exhaustive studies of rural conditions at the present time, therefore, are warranted only in connection with epidemiological studies."

Typhoid fever in Ohio with some observations on outbreaks at various places, H. M. Platter (*Quart. Bul. Ohio Bd. Health, 1 (1909), No. 3, pp. 184–190*).—In view of an unusual increase in typhoid fever in Ohio during the summer of 1909, investigations were made as to the extent and causes of the outbreaks. The unusual prevalence of rural typhoid shown by these investigations is attributed to a variety of causes, including the spending of vacations in infected communities, the wide interchange of milk and raw food supplies, and contaminated water supplies.

"A great number of farm wells are contaminated from the surface. Under such circumstances if a member of the family acquires typhoid fever away from home and the most scrupulous care is not taken of the discharges from the beginning of illness the water supply becomes contaminated with the typhoid poison and, if the patient be in the family of a milk or vegetable producer, [such contamination] will be followed by other cases not only in the family, but by epidemics of no mean proportions in the city consuming his supply."

A study of the bacteriology of drinking water supplies in tropical climates, W. W. Clemesha, I. S. Aiyar, and V. G. Mudaliyar (*Madras: Govt., 1909, pp. 346; rev. in Lancet [London], 1909, II, No. 15, pp. 1076, 1077*).—This book is based largely upon studies of the water supplies of Madras, India.

The purification of some textile and other factory wastes, H. Stabler and G. H. Pratt (*U. S. Geol. Survey, Water-Supply Paper No. 235, pp. 76*).—"This paper gives a brief outline of the processes of scouring wool, bleaching cotton yarn and cloth, dyeing cotton yarn, and manufacturing oleomargarine, glue, and fertilizer. The waste waters of these processes are considered in detail and means of purifying them are discussed at length, special prominence being given to the investigations of the authors. These investigations . . . consisted of the determination of the effects of special industrial wastes on streams, their

persistence, their relation to health, their damage to natural water resources, and the best methods of disposing of them, purifying them, or recovering valuable materials contained in them."

Attention is called to the fact that "a large amount of fertilizer is made from slaughterhouse wastes, such as blood, waste meat, bones, hoofs, hair, tainted meat, diseased animals, and tankage or residue from rendering and glue-making processes. In converting these substances into commercial fertilizer, blood is dried at a moderate heat and crushed to powder; bones may be ground without preliminary treatment, or they may be treated with a volatile solvent or boiled with steam to remove fats and gelatin and then ground for fertilizer; and tankage is dried, powdered, and mixed with other fertilizing material. The valuable ingredients sought for in all stock are nitrogen, potassium, and phosphorus."

SOILS—FERTILIZERS.

A study of crop yields and soil composition in relation to soil productivity, M. Whitney (*U. S. Dept. Agr., Bur. Soils Bul. 57, pp. 127, figs. 24*).—This study is based upon evidence presented by yields of crops in Europe and the United States and on individual farms as well as upon the chemical composition of the soils of the United States as compared with those of Europe. The statistics for the United States are confined mainly to yields of wheat and corn during the past 40 years. The data for chemical composition include tables containing all analyses of soils which have been made in the United States by the acid digestion method during the past 18 years, as well as similar tables of analyses of soils of various European countries.

The author states that a careful study of the data presented appears to justify the following conclusions:

"The productivity of the newer agricultural soils of the United States and of the older agricultural soils of Europe, taken as a whole and for a nation, are not declining, as is popularly supposed. Individual farms deteriorate, and soils wear out as they have always done, but as a whole it seems probable that we are producing more crops per acre than formerly. This is undoubtedly due to many factors; to better and more intelligent cultivation, more and better systems of rotation of crops, and, in later years, to intelligent use of fertilizers—three methods of control in the hands of every individual farmer. In addition, we must recognize the increase in farm animals and stock, the improvement in seed by selection and breeding, and the increasing density in population, which is forcing attention to more intensive methods.

"So far as our information goes there is apparently no significant difference at the present time between the composition of the older agricultural soils of Europe and the newer agricultural soils of the United States with respect to potash, phosphoric acid, lime, and magnesia."

A preliminary report on the Volusia soils, their problems and management, M. E. Carr (*U. S. Dept. Agr., Bur. Soils Bul. 60, pp. 22, pls. 10, fig. 1*).—The series of soils discussed in this bulletin occupies a belt of country in southern New York, northern Pennsylvania, and northeastern Ohio, covering an area of over 10,000,000 acres, in which for the past 25 years there has been a general tendency toward decline in price of land and in some cases toward actual abandonment of farms. The name "Volusia," as applied to this group of soils, is derived from a small village in Chautauqua County, N. Y., where such soils were first encountered and mapped in 1901 by the Bureau of Soils.

The bulletin "discusses fully the characteristics of these soils and their capabilities, treating briefly the general soil problems encountered and their

bearing upon the economic problems of the region," and is based upon information obtained in soil surveys in different parts of the region as well as upon special studies of the soil conditions in parts of the region where soil surveys have not been undertaken.

The general conclusion reached is that "the soils of the Volusia series are not 'worn out' in any proper sense of the word, but, so far as the mineral matter of the soil is concerned, are abundantly supplied with the plant-food elements for the production of good crops. The difficulties encountered in crop production upon the Volusia soils arise chiefly from lack of drainage, poor physical condition, and a depletion of organic matter."

Methods of management and cropping adapted to the improvement of conditions are discussed.

The minus quantity in California soils, G. W. Shaw (*Cal. Cult., 32 (1909), No. 10, pp. 275, 294, 295*).—The cause of decline in fertility of California soils and practical methods of restoring their productiveness are discussed. The decline in productiveness is attributed to poor physical condition and deficiency of humus, and the method of improvement proposed is based upon the belief that "the maintenance of fertility or productiveness of soils is very largely a matter of the upkeep of the humus content."

The agricultural soils of Cape Colony, C. F. Juritz (*Agr. Jour. Cape Good Hope, 34 (1909), Nos. 4, pp. 422–436; 5, pp. 550–567, figs. 2, dgms. 2; 6, pp. 675–697, figs. 3, dgms. 2*).—This series of articles discusses the geological relations and plant food, alkalinity, and physical composition of Cape Colony soils in a summing up of the results of a rather comprehensive and systematic study of these soils. See also a previous note (E. S. R., 20, p. 1014).

The average composition of the various types of soil examined is as follows:

Geological origin and average composition of types of Cape Colony soil.

Geological formation.	Number of soils analyzed.	Water.	Lime.	Potash.	Phosphoric oxid.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*
Pre-Cape rocks:					
Malmesbury series	16	1.02	0.079	0.124	0.039
Granite	9	1.19	.049	.069	.048
Campbell Rand series	7	3.99	4.169	.048	.057
Pniel series	9	2.90	.246	.068	.069
Olive shales	12	1.48	.048	.055	.031
Cape system:					
Table Mountain series	46	1.08	.034	.031	.036
Bokkeveld series	18	1.27	.387	.231	.118
Common horizon of Table Mountain and Bokkeveld series	11	.93	.042	.141	.075
Witteberg series	4	3.49	.051	.058	.065
Karroo system:					
Dwyka series	2	2.44	1.013	.138	.059
Burghersdorp beds and Stormberg series	24	2.29	.233	.172	.078
Cretaceous system:					
Uitenhage series	21	1.44	.299	.181	.087
Recent deposits:					
Sand downs	2	....	.078	.030	.027
Transported silts and river deposits	11	2.86	.584	.153	.106

The methods and results of special studies of the amount and character of the soluble salts in different groups of soils as affected by irrigation, rainfall, and other conditions are reported and discussed. Sodium chlorid and sulphate were often found to be dominant constituents of the soluble salts, sodium carbonate less frequently. The soils are classified with reference to mechanical composition, especially the percentage of fine earth, which varied from 56.3 per cent in one group to 100 per cent in another.

Investigations into the physical composition of some Cape Colony soils, C. F. JURITZ (*Reprint from Ann. Rpt. So. African Assoc. Adv. Sci., 1908, pp. 18*).—Detailed mechanical analyses of a large number of typical soils are reported. These analyses were made for the purpose of ascertaining the physical condition and properties of soils especially adapted to different classes of crops, as well as the amount of moisture these soils are capable of retaining. The method of mechanical analyis used is briefly outlined.

The importance of mechanical analysis of soils, C. EBERHART (*Fühling's Landw. Ztg., 58 (1909), No. 5, pp. 176-188*).—The importance of mechanical analysis and the relative merits of different methods are discussed.

A method for the determination of the external and internal soil surface, F. SCHEEFFER (*Jour. Landw., 57 (1909), No. 2, pp. 121-135, figs. 3; abs. in Chem. Zentbl., 1909, II, No. 11, p. 931*).—The method proposed is based upon the determination of hygroscopic water over sulphuric acid and the increase in weight when the dried soil is kept over 9 per cent carbon tetrachlorid. Tests of the method with satisfactory results on humus free soils are reported.

Heat transference in soils, H. E. PATTEN (*U. S. Dept. Agr., Bur. Soils Bul. 59, pp. 54, figs. 22*).—The primary object of the investigations reported in this bulletin "was to determine the relation between the heat conductivity and moisture content of a soil with special reference to the importance of the 'optimum water content,'" as explained in Bulletin 50 of the Bureau of Soils (E. S. R., 19, p. 818).

In the investigations reported with sand and soils of various kinds use was made of a modification of Forbes's method, which "consists in measuring simultaneously the rate of temperature rise in a soil at regular distances from the constant temperature heat source, and the difference of temperature gradient which causes this rise." The special forms of apparatus used are described and the complete data obtained are presented in tables and diagrams.

A general result of the experiments was to show that a soil conducts heat better and more quickly with a moisture content near but somewhat below that recognized as the optimum.

"The reason for this is that at the optimum water content we have the soil grains formed into larger aggregates and the spaces between these aggregates act as an air insulation against the passage of heat. As more water is added some of these soil grain aggregates break up and their constituent grains now serve to fill in the spaces between the larger aggregates, and the added water gives still better contact between the soil crumbs and the small grains. Thus the total effect is a better conduction of heat and a faster rise of temperature. But when water is added to the soil over a certain percentage (which is different for each soil) the temperature of the soil will rise more slowly, although heat is being conducted by the soil better than at a lower moisture content. This effect is produced by the high heat capacity of water, which is almost five times that of a dry soil."

"The practical value of the work lies in pointing out the nature of the soil control which should be exercised in the planting of general farm crops to secure a warm seed bed and good germination, in the handling of cranberry marshes, and other special agricultural lines."

The system water, calcium carbonate, carbonic acid, J. W. LEATHER and J. SEN (*Mem. Dept. Agr. India, Chem. Ser., 1 (1909), No. 7, pp. 117-131, pl. 1, charts 6*).—The solubility of minerals in the soils and rocks has been previously shown to be greater in the presence of carbon dioxid than with ordinary water. These tests, however, were generally made under conditions which are not as they exist in nature. From their work on the concentrations of calcium car-

bonate and carbonic acid in water, the authors conclude that soils treated with water, calcium carbonate, and carbonic acid in such proportions as they exist in nature act differently than is generally assumed.

The influence of snow cover on soil temperature, G. FRIESENHOF (*Met. Ztschr., 26 (1909), No. 6, pp. 273–275*).—The need and importance of systematic studies of this subject are pointed out and the conditions which must be taken into consideration in making such studies are explained.

Results of recent investigations in soil bacteriology and their value for agricultural practice, J. SIMON (*Mitt. Ökonom. Gesell. Sachsen, 1908–9, pp. 1–27, figs. 2*).—This article discusses the importance from an agricultural standpoint of the activities of micro-organisms in the soil in the light of recent progress in this field of investigation, and indicates the practical means that may be used to promote the beneficial activities.

The influence of depth of cultivation upon soil bacteria and their activities, W. E. KING and C. J. T. DORYLAND (*Kansas Sta. Bul. 161, pp. 211–242, figs. 3, dgms. 2*).—This is an account of preliminary experiments on the influence on the bacterial content of stirring (plowing) silt loam and fine sandy loam to different depths (2 to 12 in.).

The following volumetric method was used in these studies:

"One cc. of soil was placed in a sterile test-tube to which was added 19 cc. of sterile distilled water. This was shaken for 5 minutes, and from each tube, by means of a sterile platinum loop, which was constructed and graduated to hold 1 cu. mm. of water, approximately 1 cu. mm. of the soil suspension was transferred into 10 cc. of sterile liquefied agar. The inoculated medium was then poured into a sterile Petri dish."

A special form of small steel soil sampler and a sample case used in the work, as well as the method of taking the samples, are described.

"The soil sampler is made of steel and consists of a steel tube 7 cm. long with an inside diameter of $\frac{3}{8}$ in. and an outside diameter of $\frac{7}{16}$ in. The plunger, with a plunger-rod $\frac{1}{8}$ in. in diameter, is connected with the cylinder through a $\frac{1}{8}$ in. hole, and is clamped and held at the desired place by a set screw. The plunger-head is just a working fit inside the cylinder. The plunger-rod is graduated so that the plunger-head allows 1, 2, 3 or 4 cc. of soil to be taken, as desired."

The following conclusions are suggested by the results:

"Deep plowing (8 to 10 in.) tends to increase the number of soil bacteria in both sandy and silt soils.

"Deep plowing tends to increase bacterial activity. More ammonia is produced.

"Deep plowing tends to decrease denitrification or the reduction of nitrates and the liberation of free nitrogen.

"The volumetric method of quantitative bacteriological soil analysis has the following possible advantages over the gravimetric method: (*a*) It is more simple and convenient; (*b*) there is less danger of contamination; (*c*) the results are placed on a more accurate basis for comparison. The volumetric method can be used to advantage when comparative results are desired.

"Increased soil temperature increases bacterial activity.

"An excess of moisture in soil reduces the number of bacteria and is detrimental to bacterial activity.

"The maximum number of bacteria is found within the fifth and sixth inches. Either side of this zone the numbers of bacteria decrease.

"Due to certain conditions, different species of bacteria are present in soil, at different times in predominating numbers.

"Bacterial life and activity seem to rise and fall with more or less regularity. These periods of maximum and minimum activity are to a certain extent independent of moisture and temperature and are possibly due to the presence of bacterial by-products."

The assimilation of atmospheric nitrogen by soil micro-organisms, F. Stránák (*Ztschr. Zuckerindus. Böhmen, 33 (1909), No. 10, pp. 599–614; abs. in Chem. Abs., 3 (1909), No. 18, pp. 2192, 2193; Jour. Chem. Soc. [London], 96 (1909), No. 562, II, p. 692; Chem. Zentbl., 1909, II, No. 8, pp. 647, 648; Chem. Ztg., 33 (1909), No. 95, Repert., p. 409; Centbl. Bakt. [etc.], 2. Abt., 25 (1909), No. 10–13, pp. 320, 321*).—The work of other investigators on this subject is reviewed, and the author's own experiments with *Azotobacter chroococcum* are described with a full account of methods of isolating the organism.

A comparison of various sugars as carbohydrate food for the organism showed that arabinose was the most efficient source of such food and indicates that the pentosans of the soil are of great importance in the assimilation of nitrogen by soil bacteria. The average consumption of carbohydrates per gram of nitrogen assimilated was 165 gm. in case of glucose. In the presence of nitrates Azotobacter derived its supply of nitrogen from this source and not from atmospheric nitrogen. The organism reduced nitrate nitrogen to ammonia.

In soil tests inoculation with Azotobacter caused a pronounced increase in the yield of beets, grain, and potatoes. In a pot experiment inoculation with pure culture of Azotobacter gave less increase in yield than was obtained with inoculating material prepared as follows: Inoculate 5 kg. of soil containing 250 gm. of glucose with 500 cc. of a glucose culture of Azotobacter and allow to incubate for 3 months at 24° C.

Azotobacter was found to be widely distributed in cultivated fields, meadow land, and forest soils, but absent from many virgin soils and soils at considerable elevations. It was abundant, however, in virgin soils having a luxuriant growth of blue and green algæ.

Bacillus amylobacter and the regeneration of the power of assimilation of free nitrogen, J. E. Weiss (*Jahrb. Naturw., 24 (1908–9), pp. 221–223*).—This is a brief review of the investigations of Bredemann on this subject (E. S. R., 21, p. 717).

On the mechanism of denitrification by indirectly denitrifying bacteria, L. Grimbert and M. Bagros (*Jour. Pharm. et Chim., 6. ser., 30 (1909), No. 1, pp. 5–10; abs. in Rev. Gén. Sci., 20 (1909), No. 20, pp. 832, 833*).—A continuation and completion of previous investigations is here reported. The influence of different kinds of carbonaceous food on the fixation of nitrogen by *Bacillus coli* was studied No denitrification occurred in nitrated peptone cultures when either various carbonaceous substances or amid or amin compounds were added separately, but when the two classes were combined there was immediate and active development.

Bog toxins and their effect upon soils, A. Dachnowski (*Bot. Gaz., 47 (1909), No. 5, pp. 389–405, figs. 2*).—Investigations are reported which indicate that the sterility of many swamp and muck soils is due to the presence of toxins dependent mainly upon physical and chemical factors but also influenced by excretion from roots and rhizomes of plants. The roots of wheat plants grown in untreated bog water contained on their surface numerous colored bodies resulting from the oxidizing action of the roots, but the general decay of the root tips indicated that the oxidizing power was insufficient to decrease the injurious effects of the bog toxins. Treating the bog water with an insoluble absorbent agent invariably proved beneficial. The presence of small amounts of toxic substances accelerated growth. The capacity of soils for retaining the toxins was found to be higher the greater the content of humus.

The physiological action of soil extracts, H. FISCHER (*Centbl. Bakt.* [*etc.*], *2. Abt., 24* (*1909*), *No. 1–4, pp. 62–74*).—Studies of the Löhnis-Remy method of bacteriological examination which gave results unfavorable to the method are reported.

Soil culture in dry regions where irrigation is impossible, M. KOSTRITSINE (*Ann. Gembloux, 19* (*1909*), *No. 11, pp. 593–617, fig. 1*).—The experience of dry regions of the United States and other countries is reviewed and discussed with reference to application to Russian conditions. A short bibliography is given.

Observations on the value of stall manure, T. PFEIFFER (*Fühling's Landw. Ztg., 58* (*1909*), *No. 5, pp. 161–176*).—Valuation based on the content of phosphoric acid, potash, and nitrogen is discussed.

The influence of fertilizers on the composition of plants (*Engrais, 24* (*1909*), *No. 40, p. 1108*).—This is a note based upon investigations at the experiment station of Pas-de-Calais on the effect of superphosphate and a mixture of superphosphate and potash on three varieties of wheat, and at the Agronomic Institute of Paris on the effect of sulphate of ammonia and nitrate of soda on the gluten content of grain.

In the first experiments it was found that both the phosphatic and potash fertilizers increased the yield but not the gluten content of the grain. The results of the second experiments were not conclusive as to the effect of nitrogenous fertilizers in increasing the gluten content.

Experiments with fertilizers and manure on tobacco, corn, wheat, and clover in the Miami Valley (*Ohio Sta. Bul. 206, pp. 21, dgms. 3*).—"These experiments were begun in 1903 on tobacco, grown both continuously and in rotation with wheat and clover, and in 1904 and 1905 on corn and wheat, grown in a rotation of corn, wheat, and clover. A description of the soil and the plan of the experiments with tobacco are given in Bulletin 161 of this station [E. S. R., 17, p. 245], and a continuation of the work with tobacco up to 1905 is reported in Bulletin 172 [E. S. R., 18, p. 138]. The rotation of corn, wheat, and clover is in part reported in Bulletin 182 [E. S. R., 19, p. 315], and the statistics of all the crops up to 1906 are given in Bulletin 184 [E. S. R., 20, p. 428]."

This bulletin contains data for 1907 and 1908. The results for the whole period bring out the general fact that the judicious use of manures and fertilizers will greatly and profitably increase the yield of crops on the upland soils of the Miami Valley. These soils were originally very fertile but have been subjected for many years to a course of agriculture which involves systematic soil exhaustion. "They show that the most effective manure is that which has not been subjected to the losses which occur in the open barnyard, and they indicate that the most effective fertilizer is one containing nitrogen, phosphorus, and potassium—all three.

"No urgent need of lime has as yet been developed in the soil under these experiments, and this was to be expected from its geological history. It has not yet been demonstrated, however, that moderate applications of lime may not be useful, especially upon those fields in this region which have been longest under cultivation."

Fertilizers for cotton soils, M. WHITNEY (*U. S. Dept. Agr., Bur. Soils Bul. 62, pp. 24, fig. 1*).—This bulletin gives a compilation of yields of cotton on fertilized and unfertilized soils of various kinds obtained in 2,802 tests reported by the state agricultural experiment stations during the period from 1887 to 1907.

Comparing the yield with various fertilizing materials singly and combined in various ways with the yields obtained on unfertilized plats of the same soil, deductions are drawn as to the effectiveness of single substances and mixtures, the effect of various amounts of fertilizers, and relation of fertilizer effect to

natural productiveness of the soil, but as pointed out in the bulletin "the duplicate 'check' plats show such wide variations that considerable latitude must be allowed in the interpretation of all results, and the quantitative comparisons should not be given too great weight."

New nitrogenous fertilizers utilizing atmospheric nitrogen (*Rev. Gén. Chim., 12 (1909), No. 17, Sup., pp. 459–463*).—This is an abstract of a report by R. Guillin to the International Congress of Applied Chemistry at London regarding what has been done in France in the manufacture and use of such products, referring more particularly to Schloesing's modification of the Norwegian process of manufacturing nitrate of lime and Grandeau's experiments to determine the fertilizing value of the atmospheric products.

The utilization of atmospheric nitrogen, particularly for the manufacture of air saltpeter, A. Bernthsen (*Engin. and Min. Jour., 88 (1909), No. 16, pp. 773–776; Rev. Gén. Chim., 12 (1909), No. 15, pp. 257–272; Umschau, 13 (1909), No. 31, pp. 643–650, figs. 5; Rev. Electrochim. et Électrométal., 3 (1909), No. 7, pp. 193–208*).—See a previous note (E. S. R., 21, p. 53).

Calcium cyanamid and dicyandiamid, D. N. Prianishnikov (*Abs. in Chem. Ztg., 33 (1909), No. 69, p. 626; Jour. Soc. Chem. Indus., 28 (1909), No. 13, p. 724*).—This is a note on a paper presented at the International Congress of Applied Chemistry at London, which reports the results of experiments on various plants with calcium cyanamid in comparison with nitrate of soda.

In pure sand in which micro-organisms were not active the cyanamid acted as a poison on all plants when the seed was planted at less than 1½ months after the application of the fertilizing material. A study of the changes which occur in connection with loss of nitrogen from the cyanamid showed that when the material was spread out in thin layers as high as 66 per cent of the total nitrogen was lost. A part of the nitrogen was recovered as ammonia when the gaseous products of decomposition were drawn through sulphuric acid. About 27 per cent of the total nitrogen of the cyanamid was dissolved by treatment in the cold, about 49 per cent when subjected to hot solution.

The formula of dicyandiamid is discussed.

Nitrolime, Ragondet (*Jour. Soc. Cent. Agr. Belg., 56 (1909), No. 8, pp. 250, 251*).—The advantage of mixing nitrolime (lime nitrogen) with nitrate of lime is discussed. Such mixtures have a high content of nitrogen and good mechanical condition.

Do certain potash salts exert a beneficial influence on the growth of plants through their water-holding capacity? B. Tacke (*Deut. Landw. Presse, 36 (1909), No. 71, pp. 753, 754*).—In pot experiments it was found that the use of amounts of potash salts which may be employed in practice exerted an appreciable influence in reducing the amount of water taken up from the soil. The influence was more marked in the case of crude salts than in case of pure salts, due to the larger amounts used of the former.

On the injury resulting from the use of kainit in the bedding of domestic animals, O. Brandes (*Ueber die Schädlichkeit des Einstreuens von Kainit in die Stallstreu der Haustiere. Inaug. Diss. Bern, 1908; rev. in Deut. Tierärztl. Wchnschr., 17 (1909), No. 32, pp. 474, 475; Deut. Landw. Presse, 36 (1909), No. 64, p. 689*).—The use of kainit under animals as a manure preservative is condemned on account of a pronounced injurious effect on the skin of animals, which is described, and its poisonous action on fowls which pick up and eat particles of the salt.

The use of potash silicate as a fertilizer, E. Wein (*Deut. Landw. Presse, 36 (1909), Nos. 75, pp. 794, 795; 76, pp. 807, 808; 77, pp. 816, 817; Illus. Landw. Ztg., 29 (1909), Nos. 74, pp. 699–702; 75, pp. 707, 708; 78, pp. 739, 740*).—In four years' experiments on different soils and crops the use of potash silicate gave on the whole very good results as compared with other potash salts.

Phonolith, a new potassium fertilizer, A. Verwey (*Chem. Weekbl., 6 (1909), No. 21, pp. 359–367; abs. in Chem. Abs., 3 (1909), No. 18, p. 2194; Chem. Zentbl., 1909, II, No. 8, p. 648*).—This is a discussion of the value of phonolith as a fertilizer, based on the results of numerous analyses made by the author and on his interpretation of the conclusions of Wein already noted (E. S. R., 20, p. 822).

The average percentage of potash is given as 9.51, none of which is in a water-soluble form; about 3 per cent is soluble in a large quantity of concentrated hydrochloric acid.

The following points in regard to the use of this substance as a potash fertilizer are given: (1) It can be easily applied, since it is in a dry and fine condition; (2) no injury to the hands is to be feared, since it is an almost neutral material; (3) it has no properties injurious to plants; (4) the absence of chlorin is an advantage for plants like potatoes, beets, etc.; (5) the time of application is immaterial, since leaching is not to be feared.

Methods of analysis are described in considerable detail.

Phonolith, a new fertilizer, H. Lindeman (*Chem. Weekl., 6 (1909), No. 25, pp. 413–430; abs. in Chem. Abs., 3 (1909), No. 18, p. 2194; Chem. Zentbl., 1909, II, No. 8, p. 648*).—The author disagrees with some of the statements and most of the conclusions of Verwey noted above, and thinks additional experiments are needed to ascertain the value of phonolith as a fertilizer.

Development of chemical activity in the field of superphosphate manufacture, L. Schucht (*Chem. Ztg., 33 (1909), No. 66, pp. 589–592*).—This is a paper presented at the International Congress of Applied Chemistry at London, and reviews chemical work bearing upon the process of converting raw phosphates of various kinds into superphosphate.

The lime in basic slag, J. Hendrick (*Jour. Soc. Chem. Indus., 28 (1909), No. 14, pp. 775–778; abs. in Chem. Zentbl., 1909, II, No. 9, p. 742*).—Chemical studies of various samples of Thomas slag are reported which "indicate that the basic lime in slag is not only a very variable quantity, but that it consists of lime in various forms of combination. A little of it is free caustic lime. The rest is in combination, such as silicates and basic phosphates. A part of this combined lime is readily liberated, and will probably readily act in the soil as a base. Other portions are only liberated with greater difficulty and slowly. As the conditions are very complex, it is impossible to draw any line and state an exact percentage of basic lime in slag except in terms of a strictly defined method of determining it."

Investigations on the fertilizing value of sulphur water (*Deut. Landw. Presse, 36 (1909), No. 67, p. 717*).—Experiments on winter barley and wheat with the condensed liquid obtained in the coking of brown coal are reported. This material contains a considerable amount of nitrogen (about 1.5 per cent) and was of some fertilizing value when used in moderate amounts and applied some time in advance of the sowing of the grain in order to permit of weathering of the sulphur compounds present. See also a previous note (E. S. R., 20, p. 431.)

Peat resources of the United States, exclusive of Alaska, C. A. Davis (*U. S. Geol. Survey Bul. 394, pp. 62–69*).—The available supply of peat in the United States is roughly estimated at 12,888,500,000 tons, the greater part of the material occurring in that portion of the country which has no productive coal fields. The successful use of peat "as a source of producer gas, of a form of charcoal or coke, of various by-products from the coke retorts similar to those obtained from wood distillation, of fuel and illuminating gas, of fertilizer filler, of paper, of litter for stables, and of packing materials" is referred to.

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Fish guano, L. M. DOUGLAS (*Irish Farming World, 22 (1909), No. 1094, p. 176*).—This is a brief account of the extent and methods of manufacture of fish guano in the United Kingdom and of the fertilizing value of the product obtained.

Production and consumption of manufactured fertilizers (*U. S. Dept. Agr., Bur. Statis. Crop Reporter, 11 (1909), No. 10, p. 71*).—Statistics compiled from the censuses of 1900 and 1905 (E. S. R., 20, p. 825) are given, with an estimate of the amount of fertilizers consumed in 1907–8 in the States of Kentucky, Tennessee, Mississippi, Virginia, Florida, North Carolina, Louisiana, Alabama, South Carolina, and Georgia. The total consumption for the States named is estimated at 2,786,430 tons.

Progress in the fertilizer industry, 1905–1908, W. MÖLLER (*Chem. Ztg., 33 (1909), Nos. 60, pp. 538–540, figs. 4; 61, pp. 546–548, figs. 4; 62, pp. 554–556, figs. 5; 63, pp. 562–564; 64–65, pp. 571–574*).—This review deals with raw materials, plant, machinery and processes, and scientific investigations bearing on the fertilizer industry.

[Analyses of fertilizers, soils, and waters], ALICE R. THOMPSON (*Hawaii Sta. Rpt. 1908, pp. 60–62*).—Determinations of the fertilizing constituents in castor pomace, peanut meal, and whole plants of cowpeas, pigeon peas, and jack beans, as well as chemical analyses of 7 samples of Hawaiian soils, are reported and briefly discussed. Analyses of an alkaline irrigation water and of 14 samples of lysimeter drainage waters are also referred to.

The castor pomace contained 5.2 per cent of nitrogen, 1.8 per cent of phosphoric acid, 1.3 per cent of potash, and 1 per cent of lime; the peanut meal 8.4 per cent of nitrogen, 1.6 per cent of phosphoric acid, 1.3 per cent of potash, and 0.5 per cent of lime. The irrigation water contained 78.27 gr. per gallon of total solids and 35.23 gr. of salt. Its use had resulted in the death of young fruit trees. It is stated that the results of the analyses of the rice lysimeter drainage waters "indicate that ammonium sulphate used as a fertilizer causes loss of lime in the soil. Addition of magnesium salts causes an increase of magnesia in the drainage water. Only traces of phosphoric acid were found in the sample of water."

Commercial fertilizers and chemicals, T. G. HUDSON, R. E. STALLINGS, ET AL. (*Bul. Ga. Dept. Agr., 1909, No. 49, pp. 185*).—This report gives the text of the state fertilizer laws and rulings of the commissioner of agriculture under the law, fertilizer formulas for special crops, tables giving the average composition of fertilizing materials of various kinds, and analyses and valuations of 2,274 brands of fertilizers inspected during the season of 1908–9, representing estimated scales of about 884,000 tons.

Fertilizer analyses, A. J. PATTEN and C. B. COLLINGWOOD (*Michigan Sta. Bul. 256, pp. 345*).—This is a report in the usual form of the results of the inspection of 346 samples of fertilizers representing 167 different brands collected during the months of April, May, and June, 1909.

New state fertilizer laws (*Amer. Fert., 30 (1909), No. 6, pp. 16–22*).—The text is given of the amended South Carolina law which went into effect on the date of its approval by the governor, March 2, 1909, and of the amended Pennsylvania law which was approved May 1, 1909, to go into effect on and after July 31, 1909.

AGRICULTURAL BOTANY.

The perception of light in plants, H. WAGER (*Ann. Bot. [London], 23 (1909), No. 91, pp. 459–489, pls. 2, figs. 3*).—The author has investigated the claims of Haberlandt that the cells of the epidermis of diaheliotropic leaves cause a convergence of the rays of light, resulting in the heliotropic orientation of the leaf.

The author claims that this hypothesis is open to criticism, both on morphological and physiological grounds.

The lens cells are present in many cases on leaves and other organs where there is no question of their functioning in light perception. In experiments in which the elimination of the lens function has been effected the results have been so contradictory that no definite conclusions can be based on them. In some special cases the lens cells did appear to bring about a concentration of the light on the chlorophyll grains, and this would seem to indicate that they are effective in promoting a greater illumination of the chlorophyll grains. With the possible exception of these few cases, the author concludes there is no satisfactory evidence to show that the lens-shaped cells can be regarded as special adaptations, either for light perception or for the more efficient illumination of the chlorophyll grains.

The photodynamic effect of extracts from etiolated plants, W. Hausmann and L. von Portheim (*Biochem. Ztschr.*, *21* (*1909*), *No. 1–2*, *pp. 51–58*).—Experiments were made with methyl-alcoholic extracts of etiolated seedlings of wheat, oats, maize, barley, peas, and beans, and the extracts were found to have a photodynamic effect even though the solutions were only slightly tinged with yellow. The extracts were found to produce hemolysis of blood corpuscles in an hour or less, dependent upon the source from which they were obtained, when placed in the light, but they were without effect when kept in the darkness. Attention is directed to the fluorescent effect possessed by the extracts.

The influence of some nutrient solutions on the germination and development of fungi, O. Lutz (*Ann. Mycol.*, *7* (*1909*), *No. 2*, *pp. 91–133*).—Experiments are reported in which various fungi were sown in culture media in which fungi had been previously grown. One lot of the media was sterilized, the other not, and the fungi used in the experiments were *Aspergillus niger*, *Botrytis cinerea*, *Cladosporium herbarum*, *Fusarium solani*, *Mucor mucedo*, *Penicillium glaucum*, and *Rhizopus nigricans*. The effect of the media on germination and development was noted.

In some instances the growth was retarded and in others accelerated, the exact reason for this behavior and the chemical nature of the materials left by the growth of the fungi being undetermined. The action is apparently enzymic, the substances secreted by the fungi readily passing through a filter. They are destroyed or greatly modified by high temperatures, and an exposure of 20 minutes to direct light or to the violet rays of the spectrum destroyed them. *F. solani* and *A. niger* sown in the medium which had formerly grown these organisms were stimulated in their vegetative growth. The metabolic products given off by the fungi enumerated above were found to stimulate or retard not only the same species grown in the medium, but other fungi as well.

The effect of heat on diastatic ferments, J. Apsit and E. Gain (*Compt. Rend. Soc. Biol.* [*Paris*], *67* (*1909*), *No. 28*, *pp. 367–369*).—The effect of heat on the diastase of wheat was investigated, grains being subjected to boiling water for 25 minutes and to the action of dry heat at 160° for 20 minutes. In both cases the vitality of the seed was destroyed, but the diastatic functions were retained.

It appears that the diastases resist the action of heat to a greater extent than the germinative faculty. In the wheat grains the vitality of which had been destroyed by heat there was still sufficient amylase present to bring about the saccharification of starch.

The relation between the rennet and proteolytic ferments of plants and their function, C. Gerber (*Compt. Rend. Soc. Biol.* [*Paris*], *67* (*1909*), *No. 28*, *pp. 332–334*).—From a study of the active principle found in the papaya the author is led to believe that there is a close relationship between vegetable rennets and proteolytic enzyms of plants. Their wide distribution and action leads him to suppose that they have a diastatic action assisting in the synthesis,

translocation, and use of the reserve proteids, and that they are actively concerned in the nutrition of the pollen tube in its development.

A method for the rapid recognition of hydrocyanic acid in plants, M. MIRANDE (*Compt. Rend. Acad. Sci. [Paris], 149 (1909), No. 2, pp. 140–142*).—The author has found that by introducing specimens of plants containing glucosids that yield hydrocyanic acid in tubes or flasks containing chloroform and a fragment of the picric-sodium paper described by Guignard (E. S. R., 18, p. 626), the presence of hydrocyanic acid is quickly determined by the change in the color of the paper.

By making experiments with vapors of mercury, carbon bisulphid, chloroform, ether, etc., it was found that under the influence of vapors which suspend the chlorophyll function of plants the plants containing hydrocyanic compounds will give off the acid, and that even after the plants are dead the action will be continued for some time.

This forms a simple method for the recognition of hydrocyanic acid in plants, and by this means it has been possible to show the presence of that compound in plants where the ordinary methods of maceration and distillation failed.

The influence of anesthetics and freezing on the splitting up of glucosids in plants, L. GUIGNARD (*Compt. Rend. Acad. Sci. [Paris], 149 (1909), No. 2, pp. 91–93*).—Attention is called to the method of Mirande (see above) for the rapid demonstration of the presence of hydrocyanic acid in plants, and in addition to anesthetics, freezing of plants is said to result in a similar manner.

The elaboration of nitrogenous material in the leaves of plants, G. ANDRÉ (*Compt. Rend. Acad. Sci. [Paris], 148 (1909), No. 25, pp. 1685–1687*).—A study was made of the nitrogen content of chestnut trees at various stages of their growth.

The highest total nitrogen was found at the earliest date of examination, May 13, and the proportion of nitrogen to dry matter decreased regularly throughout the season. The percentage of amid nitrogen to total nitrogen was greatest just after the leaves had attained full size. It fell off quite sharply toward the flowering period, after which there was a progressive increase until the end of the season. The amount of nitric nitrogen found was small at the beginning, and soon was represented by a mere trace. The small amount of nitric nitrogen present raised the question as to the source of nitrogen in the metabolism of the plant, and it is thought probable that some other source of nitrogen must be available than the nitrates obtained from the soil.

The reduction of assimilation by plants during cloudy weather, A. MÜNTZ and H. GAUDECHON (*Compt. Rend. Acad. Sci. [Paris], 149 (1909), No. 3, pp. 190, 191; Bul. Soc. Nat. Agr. France, 69 (1909), No. 7, pp. 633–635*).—The authors have investigated the relation existing between the illumination of plants and their carbon dioxid assimilation. Experiments were conducted with wheat plants in which the illumination was varied to correspond to different degrees of cloudiness, and the oxygen given off was determined as a measure of the carbon dioxid assimilation. In direct sunshine the plants were found to assimilate 4 or 5 times as much carbon dioxid as was the case under heavy clouds and rainy weather.

From these data the authors have computed the rate of assimilation per hectare for wheat and find that on a bright day a hectare of wheat would assimilate carbon dioxid sufficient to form 22 kg. of starch, representing 33 kg. of wheat, while on an overcast day the amount assimilated would correspond to 4.7 kg. of starch, representing 7 kg. of grain.

The authors conclude that in France a large proportion of cloudy days during June and the first half of July will materially reduce the harvest through the reduction of chlorophyll activity on the part of the plants.

Investigations on the later resting stages of bulbs, P. Christensen (*Overs. K. Danske Vidensk. Selsk. Forhandl., 1908, No. 6, pp. 427–468*).—The object of the study was to ascertain the causes for the difference in rate of growth of bulbs planted in October, December, and January. Experiments were conducted during two years with tulips, the bulbs being planted in flower pots and stored in a dark frost-free cellar until subjected to examination. The time required for the shoots to attain definite lengths was noted, and the bulbs with their leaves and shoots were subjected to a chemical examination in which the dry matter, various forms of nitrogen, soluble carbohydrates, starch, and pentosans were determined.

From the data obtained the author is led to believe that the difference in the growing power of bulbs planted in October, December, and January could not be referred to differences shown by a quantitative or qualitative study of the reserve material in the bulbs. The slow growth of the October bulbs was not due to a lack of readily soluble compounds that go to make up the reserve material in the bulb, but is believed to be associated with the metabolism accompanying growth.

The possible effect of cement dust on plants, G. J. Peirce (*Science, n. ser., 30 (1909), No. 775, pp. 652–654*).—The author's attention has been called to the deposit of light gray dust on plants and various surfaces in a valley not far from San Francisco. Upon investigation it was found that the foliage of the native and cultivated plants for a distance of more than 6 miles was covered with dust from cement works. The upper surface of many leaves, such as oak, willow, grape, etc., was thickly covered, but on glossy leaves, such as peach, lemon, and orange, it was not held. On the fruits it was quite evident and could not be removed without rubbing off the bloom. On investigation the material was found to be so finely ground and to cover the leaves to such an extent that the exchange of gases in the leaves was prevented to a considerable extent, the stomata in some cases being clogged with the fine particles.

The conclusion of Haselhoff and Lindau (E. S. R., 14, p. 633) that cement dust does no harm to vegetation in Germany since it is washed off by frequent showers, is held not to apply in California, where the atmospheric conditions are quite different, there being practically no rain after the leaves of deciduous plants have developed. In some parts of California the frequent summer fogs give rise to considerable moisture, but these together with the rains that may be expected do not wash the cement from the leaves, but tend to form it into a permanent crust.

Vitality of seeds under water, J. J. Thornber (*Arizona Sta. Bul. 60, pp. 438–441*).—On account of the fact that the Colorado River annually overflows its banks, submerging the land from 2 to 6 weeks, the author investigated the vitality of a considerable number of species of seeds which were submerged for various periods of time. A preliminary account of these investigations has already been noted (E. S. R., 20, p. 628).

In general it was found that amber cane or common sorghum is the only crop that can be sown successfully before a protracted flood period begins.

FIELD CROPS.

Field crop experiments, F. G. Krauss (*Hawaii Sta. Rpt. 1908, pp. 65–84, pls. 4*).—This is a continuation of work previously noted (E. S. R., 20, p. 137).

A sketch of and data pertaining to the rice growing and milling industries in Hawaii are presented, together with United States customs statistics on the exportation and importation of rice for the five years ended June 30, 1907.

During the year the third comparative test was made of 130 varieties of rice originally obtained from this Department. Pure strains of some of the varieties

grown the previous year were disseminated among rice growers and pure strains of stock seed of Nos. 19, 39, 65, 68, 153, and 154a are reported as available for distribution. Of those already distributed No. 19 is the most noteworthy but is suitable for fall culture only. No. 153, a strain of Japan rice, yields as heavily in 110 days as the more slowing maturing Hawaiian type of Gold Seed. No. 65 yields well but is slow in maturing and lacks the flavor desired by Japanese consumers. No. 152 failed to set seeds after the first year, during which it had promised well. No. 73, another Philippine rice, yielded well. Seven Japanese varieties, 5 new and 2 previously tested, all promised well. In a milling test of 4 varieties, Nos. 65 and 73 showed the best results, each with 67 per cent of prime rice and 1 per cent of broken rice.

With reference to the Japanese claim that Hawaiian-grown rice is lacking in strength, richness, and fattiness as well as in flavor, analyses made by the Bureau of Chemistry of this Department are reported as follows:

Comparative composition of imported and Hawaiian-grown Japan rices.

Types.	Moisture.	Protein ($N \times 6.25$).	Fat.	Carbohydrates.	Crude fiber.	Ash.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Imported Japan (in brown)	10.97	7.19	2.08	77.53	1.02	1.21
Hawaiian-grown Japan (in brown)	10.40	7.38	2.23	77.26	1.07	1.66
Imported Japan (fully milled)	11.16	6.63	.38	80.91	.46	.49
Hawaiian-grown Japan (fully milled)	10.76	7.31	.58	79.93	.60	.82

Fertilizer experiment 1 of 1908 was a continuation of experiment 3 of 1907. Its object was the determination of the residual value to the spring crop of Japan and Gold Seed rice, of fertilizers applied to the previous fall crop. The data secured are summarized in the following table:

Relative residual value of the various commercial forms of fertilizers on rice: Paddy produced by 100 clumps of rice.

Plat number	Fertilizer applied.[a]	Amount of fertilizer per acre.	Yield when fertilized before planting.		Yield when limed (750 lbs. per acre) and fertilized before planting.		Yield when fertilized after plants were three-fourths grown.		Increase in yield due to residue of fertilizer (13 per cent allowed for experimental error).	
			Japan seed.	Gold seed.	Japan seed.	Gold seed.	Japan seed.	Gold seed.	Japan seed.	Gold seed.
		Lbs.	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Per cent.*	*Per cent*
1	Nitrate of soda	266	2.4	([b])	2.7	4.4	2.5	([b])	....	([b])
2	Sulphate of ammonia	200	2.5	3.8	2.5	4.0	3.3	4.6	30	63
3	Sulphate of potash	95	2.3	2.7	2.4	3.3	3.1	4.5	21	60
4	Sulphate of potash and magnesia	180	2.3	2.7	2.4	3.2	3.4	4.7	34	67
5	Acid phosphate	125	2.4	2.6	2.6	3.4	3.1	5.1	21	83
6	Reverted phosphate	156	2.2	3.2	3.5	3.7	3.1	4.5	21	60
7	Thomas slag phosphate	156	2.4	3.0	2.5	3.6	3.0	4.3	17	52
8	Complete fertilizer A	350	2.3	3.7	2.4	3.8	2.6	4.5	....	60
9	Complete fertilizer B	350	2.2	3.7	2.3	4.0	2.5	4.2	....	48
10	Complete fertilizer C	350	2.3	3.0	2.5	3.0	2.6	4.0	....	40

[a] Plats 1 and 2 each received 40 lbs. of nitrogen; plat 3, 45 lbs. of K_2O; plat 4, 45 lbs. of K_2O and 61 lbs. of $MgSO_4$; plats 5 and 6, 25 lbs. of P_2O_5 each; plat 7, 25 lbs. of P_2O_5 and 62 lbs. CaO; plat 8 received 28 lbs. of nitrogen, 17.5 lbs. of P_2O_5 and 31.5 lbs. of K_2O from a mixture of nitrate of soda, acid phosphate, and sulphate of potash; plat 9 received 28 lbs. of nitrogen, 17.5 lbs. of P_2O_5 and 31.5 lbs. of K_2O from a mixture of sulphate of ammonia, fish guano, reverted phosphate, and sulphate of potash; and plat 10 received 28 lbs. of nitrogen, 17.5 lbs. of P_2O_5 and 31.5 lbs. of K_2O from a mixture of nitrate of soda, Thomas slag phosphate, sulphate of potash and magnesia.

[b] Weight lost.

The complete fertilizers contained only 70 per cent of the constituents applied singly and are therefore not deemed comparable with them.

Fertilizer experiment 2 was a continuation of pot fertilizer experiment 2 of the 1907 series. The pots laid fallow 6 months, then the originally fertilized soil was submerged, stirred to a depth of 4 in., allowed to settle, and planted with five 15-day-old seedlings per pot of Japan rice No. 153. Three pots constituted each series, one limed, one drained, and one untreated, save for the application of the fertilizer noted. The limed pots showed a depression of 14 to 40 per cent in yield of straw and paddy. Draining and consequent leaching produced no apparent decline. A comparison of the results of the 2 years shows that the more vigorous varieties derived the greatest benefit from the fertilizers applied. A residual value appears from most fertilizers when applied before the planting of the previous crop, but this residual value increases with the application of fertilizer to the previous crop when well advanced in growth. It remains to be determined whether the greater residual benefit of the later application of fertilizer outweighs the greater immediate benefit of application before planting.

Fertilizer experiment 3 consisted of 3 tests, at different seasons of the year, of the relative value of the different sources of nitrogen. The fertilizers applied and results are summarized in the following table:

Relative value of various forms of nitrogen for rice.

Plat number.	Fertilizer applied.	Amount of fertilizer per acre.	Height of plants at maturity.	Green weight, whole plants.	Number of culms per clump of 5 plants.	Weight of paddy per 100 clumps of rice.	Date of maturity.
		Pounds.	*Inches.*	*Pounds.*		*Pounds.*	
1	Check (no fertilizer)		33–35	45	15–20	5.3	July 20
2	Complete fertilizer	350	38–40	48	20–22	7.1	July 22
3	Stable manure	5,000	40–45	55	21–23	6.8	July 25
4	Complete fertilizer	350	40–43	51	20–25	7.9	July 20
5	Check		34–35	46	17–20	5.7	July 22
6	Green manure	20,000	40–48	60	20–25	5.9	July 30
7	Sulphate of ammonia	200	44–48	64	25–27	8.1	July 25
8	Lime nitrogen	266	38–42	50	22–24	6.7	July 25
9	Check		30–34	44	16–18	5.2	July 20
10	Nitrate of soda	266	35–38	47	20–22	5.9	July 28

Fertilizer was applied to plat 4 before planting. All other fertilizers except stable manure and green manure were applied when the crop was two-thirds grown. The green manure consisted of legumes and weeds.

Fertilizer experiments 4 and 5 to show the relative value of commercial forms of nitrogen as fertilizers for Japan Seed and Hawaiian Gold Seed rice agreed with former experiments for the same purpose in showing the greatest benefits from sulphate of ammonia, lime nitrogen, and nitrate of soda, in the order named. In experiment 4, the Gold Seed required 30 days longer than the Japan Seed to reach maturity, as an apparent result of fertilization. Nitrate of soda appeared to give its maximum benefit from late application, whereas sulphate of ammonia must be applied earlier and lime nitrogen still earlier to produce their maximum results. Large applications of nitrate of soda wasted most of the nitrogen.

Fertilizer tests on dry-land rice showed a less definite influence on the yield of paddy, on account of the very dry season. On both silt and gravelly loam muriate of potash, sulphate of ammonia, and nitrate of soda increased the yield of straw in degrees varying in the order named. No apparent influence was exerted by the other constituents applied as in experiment 1.

Cooperative experiments with a 5:9:12 fertilizer were conducted on 3 separate plantations. The mixture was applied at the rate of about 350 lbs. per acre, at a total cost of approximately $10 per acre. On the Punaluu plantation, Oahu, the increased yield was estimated at 35 per cent and the increased net profit at $6 per acre. The experiment on a 1-year paddy field adjoining the rice trial grounds at Waikiki showed an increased yield of paddy at the rate of 1,150 lbs. per acre, or 39 per cent higher than on an unfertilized portion of the field. This gave a net profit of $15 per acre due to fertilization. An adjoining test in which the greater amount of nitrogen as sulphate of ammonia was applied showed a still higher yield. The third cooperative experiment at Palama plantation near Honolulu showed an estimated increase of between 75 and 100 per cent.

In the experiment with upland rice grown with minimum irrigation all the varieties from last year's test have been eliminated except Nos. 65, 68, and 154a, and possibly No. 19. The results with these varieties are indicated by the following table:

Results obtained with a minimum amount of water upon upland rice.

Variety.	Method of planting.	Length of growing season.	Total water received (irrigation and rainfall).	Yield of paddy.	Yield of hay (approximate).
		Days.	*Acre-inches.*	*Pounds.*	*Pounds.*
No. 19 (S. P. I. Inv. No. 12508)	Drilled	190	47.0	....	10,000
No. 65 (S. P. I. Inv. No. 17144)	do	143	30.6	5,014	9,926
No. 68 (S. P. I. Inv. No. 17917)	do	109	23.5	2,080	5,920
No. 68 (S. P. I. Inv. No. 17917)	Aftermath	34	5.9	....	2,240
No. 154	Drilled	145	30.0	....	5,000

Nos. 19 and 154 failed to set seed well, while the yield of paddy for No. 68 was not estimated. The rainfall in this table is included with the biweekly irrigation which was at the rate of 2½ acre-inches per application, equivalent to about 0.2 in. per day. Nos. 65 and 68 showed a 20 per cent increase in hay yield and No. 19 a 50 per cent increase upon the application of double this amount of water, but the grain yield did not increase in proportion. Growth under submerged conditions failed to increase the yields of hay or paddy above the point reached by the weekly application. All varieties failed to make a crop with the application of 2½ acre-inches once in 4 weeks, hence the biweekly irrigation at the rate of 2½ acre-inches is regarded as the minimum moisture requirement for rice and the weekly application at that rate as about the optimum.

Under minimum moisture conditions 2 factors of equal importance in insuring a crop are light seeding and deep and thorough tillage. Seeding at the rate of 60 lbs. per acre (16 seedlings per foot) resulted in the failure of all varieties to reach the fruit stage under 10 in. of rainfall, while the quick-maturing variety, No. 68, thinned to stand 6 to 12 in. apart in drills 8 in. apart, tillered well and produced perfect seeds. With 8 plants per foot, little tillering and seed resulted. Root development under good tillage was from 4 to 6 times as great as in poorly prepared soil. "The same relative development was true of plants set well apart and those that were crowded."

Trials with salt-marsh rice gave acre yields of 14,212 lbs. total green weight, 5,852 lbs. air-cured matter as hay, and 2,842 lbs. as cured paddy. The product was valued at $73.15 per acre as cured hay, and at $56.84 per acre as paddy. The cost of harvesting, curing, and preparing for market would be about equal.

Experiments have been conducted for 2 years with the Chinese mat rush (*Cyperus tegetiformis*) and Japanese Bingo-i mat rush (*Juncus effusus*). The former yielded 19,701 lbs. per acre of cured reeds, varying in length from 36 to 60 in. and over. From 6 to 7 months were required from planting to maturity and 5 months for the rattoon crop. Sample reeds forwarded to a factory proved of commercial quality. The Japanese mat rush as yet lacks sufficient length for commercial purposes but is improving with each crop and does not require splitting.

Sea Island and Caravonica cottons have yielded a large amount of long, strong, lustrous fiber. Lint percentages ranged from 30 to 40. All cotton varieties so far tested are perennial in these islands. The shape of trees and time of maturing bolls may be controlled by pruning. These trees will average at least 5 lbs. at each of 2 pickings per year. A recent experimental picking yielded 15 lbs. of seed cotton from a single plant.

In tests of soy bean varieties obtained from the Bureau of Plant Industry of this Department, No. 21080, produced 600 lbs. of shelled beans, imported Japan, 800 lbs., and Kona seed, 1,060 lbs. per acre. The plants are less than 12 in. in height and upright in growth. They require little moisture and permit close planting. It is believed that the crop could be made a profitable one for the small farmer.

Variety and cultural tests are under way with the Spanish, Bunch Jumbo, Running Jumbo, and Virginia Running varieties of peanuts, 3 types of soil, varying in elevation and amount of soil moisture, being used in the test. A small quantity of seed of the wheat from the straw of which Italian Leghorn hats are made has been drilled in rows 12 in. apart. The plants tiller well and have apparently the same moisture requirements as upland rice. Between March 23 and June 30 the height of 36 to 40 in. was attained.

Report of work for 1907 and 1908 at Highmore substation, C. WILLIS (*South Dakota Sta. Bul. 115, pp. 557–570*).—Work on cereals previously noted (E. S. R., 18, p. 133) has been continued and later work is reported.

In 1907 the yields per acre in a variety test of Kafir corn were for Blackhull, 3 tons 993 lbs. for Milo, 2 tons 1,794 lbs., for Red Kafir, 2 tons 1,439 lbs., and for Shallu, 2 tons 1,217 lbs. Kaoliang (brown) gave an average yield of 2 tons 1,571 lbs. A series of tenth-acre plats gave average yields at the rate per acre of 5,350 lbs. sorghum fodder, 2,076 lbs. *Bromus inermis* hay, 11.25 bu. of flax 1,152 lbs. corn fodder, 23.99 bu. corn, 28.78 bu. wheat, 49.47 bu. oats, and 30.23 bu. of barley. Broom-corn millets in a variety test gave the following yields per acre: Tainboy, 27.08 bu., White Ural, 24.16 bu., Black Voronezh, 22.5 bu., Red 74–10625, 20.83 bu., Early Fortune, 20.41 bu., Red Russian, 19.58 bu., and Red Orenburg, 14.5 bu. The varieties of oats yielding 30 bu. or more per acre were American Triumph and American Beauty, each yielding 35.31 bu., Minnesota No. 26, 34.68 bu., Minnesota No. 6, 33.75 bu., Banner and Sixty Day, each 31.56 bu., Lincoln, 30.62 bu., and Swedish Select, 30.31 bu. Of the five varieties of Durum wheat tested, Kubanka showed the highest average yield at the rate of 26.87 bu. per acre. Arnautka yielded on the average 24.24 bu. per acre, Beloturka, 24.16 bu., Iumillo, 22.16 bu., and Wild Goose, 22.5 bu. per acre. Among the common wheats, No. 61.3clc yielded 24 bu. per acre, No. 2492, 19.16 bu., Red Fife 18.66 bu., South Dakota Climax and Velvet Chaff, each 18.5 bu., and Blue Stem, 16.66 bu. per acre.

During the year 1908, the varieties of Durum wheat gave average yields per acre as follows: Beloturka, 27.83 bu. per acre, Arnautka, 26.55 bu., Iumillo, 25.83 bu., Wild Goose, 25.16 bu., Kubanka, 24.12, and Pererodka, 22 bu. per acre. The varieties of oats yielding an average of 30 bu. or more per acre were Sixty Day, 47.5 bu., Kherson, 45.76 bu., Red Algerian, 32.81 bu., and Danish

and White Tartar, each 30.31 bu. The yield of varieties of common wheat producing 10 bu. or more per acre were: No. Glele, 17.5 bu., Velvet Chaff, 16.16 bu., Blue Stem, 13.58 bu., No. 2492, 13.08 bu., Minnesota, 13.05 bu., and South Dakota Climax, 10 bu. Small areas of Einkorn and Emmer, seeded at the rate of 2 bu. per acre, yielded at the rate of 500 lbs. of grain per acre of the former, and 31.77 bu. of grain per acre of the latter.

In a variety test of barley at Highmore and Brookings covering the years 1903–1908, the average yields per acre were: Striegum, 27.3 bu., Gold Melon, 29.79 bu., Minnesota, 34.5 bu., Princess, 31.25 bu., Chevalier, 37.9 bu., Hannchen, 37.68 bu., Primus, 31.99 bu., Hanna No. 24, 31.16 bu., Hanna No. 203, 29.43 bu., and Hanna No. 34, 29.71 bu.

In a test of 15 varieties of corn, the 5 highest yields were: Selection 133, 30.89 bu. per acre, Minnesota 13, 30.57 bu., Rustler White Dent, 30.53 bu., Triumph Yellow Flint, 29.73 bu., and Northwestern Dent, 28.98 bu.

The results of rotation experiments with wheat, oats, corn, barley, brome grass, rye, peas, sweet clover, and sorghum, in various combinations, are presented to show the relative merits of disking, fall and spring plowing, green manuring, summer fallow, listing, and moisture conservation methods.

Fall and winter forage crops, E. DE CILLIS (*Ist. Agr. Siciliano "Valdisavoja" Relaz. 1906–1908, pp. 147–155, figs. 4*).—The results of experiments with forage crops conducted for 2 years have shown that horse beans, berseem, and vetch are best adapted to Sicilian conditions. Crimson clover proved a failure. Berseem gave the best yields when grown alone, while horse beans were most productive when mixed with oats. A variety called white vetch gave better results than hairy vetch. A single cutting of berseem during the season gave a better yield than 2 cuttings. An application of superphosphate, lime, and sulphate of potash increased the yield of horse beans considerably.

[Work with sugar beets and potatoes], R. W. THATCHER (*Washington Sta. Rpt. 1906, pp. 19–21*).—Analyses of 124 samples of sugar beets grown in the vicinity of Ellensburg indicated that beets of high quality can be grown in that locality.

Starch determinations of 237 potato samples from various parts of the State indicated great variations in the starch content of the different varieties and in the same variety from the various localities. In no case was the starch content of a single variety constant for the different localities in which it was grown. The percentage of starch varied in general inversely with the amount of annual rainfall, the highest starch content being found in potatoes grown in the drier sections of the State. Of the methods of determining the starch content tested the polariscopic method proved apparently worthless for the purpose, but the official and specific gravity methods agreed quite closely. The work was carried out by M. T. Brislawn as a senior thesis.

A lesson in diversified farming, R. H. FORBES (*Arizona Sta. Bul. 60, pp. 417–426*).—This experiment was conducted in continuation of work previously reported (E. S. R., 20, p. 326).

Conditions during the past year were more favorable than formerly. Diversification was attempted to a much greater extent than in the previous year when dependence was placed upon tomatoes. The most successful crops grown were white Bermuda onions, Rockyford cantaloups, sweet potatoes, and tomatoes. The crop of late watermelons was destroyed by plant lice, the fall crop of potatoes was a failure, and the spring crop gave poor returns. The varieties of tomatoes giving the most favorable results were Sparks Earliana and Dwarf Champion. Several new varieties proved ill-adapted to the region.

A full statement is given of the method of cultivation and marketing, and the conclusion is drawn that the greater diversity and intensity of cultivation have been advantageous. The work of the year is summarized in the following table:

Financial results of intensive and diversified cropping on the basis of net cash returns to the small farmer.

Crop.	Acreage.	Marketable crop.	Gross receipts.	Expenditures.	Net returns.	Days' labor.		
						Men.	Women and boys.	Team.
White Bermuda onions..	1.20	23,950 lbs.	$605.73	$44.28	$561.45	87	9	10
Rockyford cantaloups...	1.00	1,600 doz.	517.71	98.79	418.92	100	12	22
Tomatoes.................	.52	5,200 lbs.	173.40	47.47	125.93	48	22	7
Sweet potatoes...........	.49	6,380 lbs.	154.99	10.85	144.14	53	....	8
Alfalfa..................	1.50	13¾ tons.	....	20.35	....	22	....	7
Potatoes.................	.25	790 lbs.	31.60	3.75	27.15	14	....	4
Watermelons..............	.50	....	....	.70		3	....	1
Total..............	5.46	....	1,483.43	226.19	1,257.24	327	43	59

The alfalfa, which was fed to the team, was valued at $100 additional.

The Truckee-Carson experiment farm, C. S. Scofield and S. J. Rogers (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 157, pp. 38, pls. 2, figs. 2*).—This bulletin describes the region in which the Truckee-Carson reclamation project is located with reference to climatic and agricultural conditions. Notes are given on possible agricultural industries which may be established there and the experiment farm together with the work inaugurated is also discussed.

Experiments on the clay land show that it should not be plowed deep at first and that special farm implements, such as turning and slicing harrows and corrugated rollers, and careful irrigation are necessary to get crops started. The sandy soils need protection from the action of the wind during the spring. It has been found that redtop, rape, and sweet clover are best adapted to the heavy soils when first broken, and that good crops of beets of a high sugar content may be secured in that section. Potatoes, corn, wheat, oats, barley, and alfalfa can also be grown. Alfalfa, which is the most important crop of the region, yields 2 or 3 cuttings per year. It was further found that crops of sugar beets, sorghum, and some grasses may be grown on alkali land with proper care in tillage and irrigation.

Natural revegetation of depleted mountain grazing lands, A. W. Sampson (*U. S. Dept. Agr., Forest Service Circ. 169, pp. 28, figs. 5*).—Previous results of this work have been noted (E. S. R., 20, p. 629).

This circular is a progress report of experiments looking toward the increase of the grazing capacity of lands in the national forests. The work was begun on the Wallowa National Forest in the spring of 1907, and has embraced studies of the abundance, distribution, seed habits, and forage value of the forage plants, their life histories, and the revegetation of overgrazed areas.

It has been determined that good seeding can be secured without the loss of any part of the season's forage. It is suggested that an area of choice forage be reserved for late grazing, and that a protective grazing system be continued until seedling plants are beyond great danger of injury. Artificial seeding may be resorted to where the natural seedling stand is insufficient after a year's protection.

Some experiments in the hybridizing of Indian cottons, P. F. Fyson (*Mem. Dept. Agr. India, Bot. Ser., 2 (1908), No. 6, pp. 27, pls. 9*).—A general description of Indian cotton plants is given and the results in breeding to the fifth hybrid generation are tabulated and discussed.

The first and most obvious result was a great increase in the size and vigor of the plants. In a cross between Jowari and Jari the first hybrid generation consisted of small plants, but in succeeding generations some plants ran up to 6 or 7 ft. in height. In general the plants bolled freely and bore well, although some of the third generation of a certain lot were very poor. The smaller and *neglectum*-leaved plants bore first and bore quite heavily, while the majority were still only in flower. Their seeds were naked and had a long silky staple but none of the lot survived.

The plants were in some cases very variable especially in the shape of the leaf. In some of the plants of the *neglectum* type the lobes of the leaf were very narrow, almost linear and a few had wavy margins. As wavy margins do not occur in the leaves of either Jari or Jowari and also since they appeared less frequently in later generations the authors are inclined to consider them as monstrosities due to variation induced by hybridization and by change of climate and soil. It was also found that there was a general tendency for plants to approximate in character with age, and that with those more than 12 months old it was often difficult to specify the nature of the leaf or of the branching.

Local adjustment of cotton varieties, O. F. Cook (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 159, pp. 75*).—Local adjustment is "the process of selection to restore the uniformity of a variety in a new place." It is attained chiefly by selection, but is entirely distinct from plant breeding for the origination of new varieties or the improvement of old ones. In many instances the introduction of well-established varieties into new localities for the purpose of variety tests or crop production has resulted in a diversity among the individual plants that can not be accounted for by ordinary variation or the uniform change in environment. This diversity and apparent deterioration has caused the rejection of these varieties, in many instances, as unfit for their new environment.

Biologically, local ajustment is analogous to acclimatization. It is of much more frequent application and more easily accomplished. It requires no greater care or ability than can be exercised by the average farmer's family. Texas experiments indicate that it will counterbalance the loss due to the boll weevil if aided by improved cultural methods and superior varieties. Local adjustment has remained unused because the new place diversity which renders it necessary has been confused with changes due to hybridization, direct effects of environment, accommodative changes, and ordinary variation found in all plants and in all places and seasons. New place diversity is quite different from these and more closely related to mutation as described by De Vries. An accommodative change is more likely to be uniformly assumed by all the plants of a variety, as when one variety adapts itself to a windy region by stronger central stem, while the individuals of another variety quite uniformly accomplish the same end by assuming a prostrate form.

The Triumph cotton in the fields of its originator is one of the most uniform of seed-propagated plants. Fifty acres produced but 3 plants that were definitely off type, yet a field of this variety at Kerrville, Tex., compared with one at Lockhart, Tex., the home of the variety, showed most radical new place diversity, adjacent plants in many instances being obviously unlike. These divergent characters are fully described in this bulletin. Some of them at least were transmitted to plants grown from the seed of these divergent plants. Still fuller notes are presented on an experiment to test this point conducted at San Antonio, Tex., with the King variety in 1907.

Failure to understand and take advantage of the facts of local adjustment has vitiated results of both the farmer's method of testing a new variety in a

small patch and the experimenter's variety test. This arises from the fact that the variety is too frequently judged either on the basis of a single year's performance and before local adjustment could possibly have taken place, or without the selection necessary to remove the divergent individuals and restore the former uniform excellence. Local adjustment applied in such instances shows marked improvement in quantity and quality of fiber as well as in uniformity of plants during the first few years after introduction into a new locality.

Correlated characters have been observed to change in accordance with their usual laws during local adjustment in at least two instances. At Yuma, Ariz., in 1908, upland cottons showed a general tendency to small round bolls and an equally general tendency to shortening of the lint, which usually accompanied this character. At Del Rio, Tex., in 1908, several selections showed increased luxuriance of vegetation accompanied by inferior lint as compared with the crop of 1907.

The utilization of local adjustment in the introduction of new varieties is essentially a matter of selection to restore the variety's uniform excellence and is completed when that end is attained. The usual precautions are to be observed with reference to a mixture of pollen by insects or of seed at the gin in order to maintain the purity of the variety.

The wide introduction of a few varieties of known excellence is recommended to displace the present multiplicity. This will bring about uniformity in the crop and simplify the problems of grading, marketing, and manufacturing.

A study of diversity in Egyptian cotton, O. F. Cook, A. McLachlan, and R. M. Meade (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 156, pp. 60, pls. 6*).—This bulletin points out the relationship of Egyptian cotton to American varieties, discusses the nature of diversities aroused by new conditions, calls attention to the diversity of recognized Egyptian varieties, and discusses the relation between diversity and external conditions and the occurrence of diversity in Egyptian-Upland hybrids. In this connection the frequency of cross-fertilization, the distinctive characters of hybrids, the principal characters for distinguishing hybrids, and the correlations of characters in such plants are also considered. A synopsis of the principal types of hybrids is given.

It is stated that the Egyptian and Upland cottons belong to the same general series of American types and are capable of showing similarly wide ranges of diversity, especially when grown under new conditions. Egyptian varieties grown at Yuma from imported seed show many forms of diversity and in plantings of Arizona-grown Egyptian seed this diversity appears to have increased even after all individuals distinguishable as hybrids have been excluded. The authors believe that the difficulty of acclimatizing Egyptian cotton is increased by the fact that the varieties have been distinguished by their lint characters alone with little or no reference to the vegetative features. It is stated that selection for long lint has not reduced the diversity of forms and that the crossing of these varied forms with each other tends to prolong the condition of diversity. It is recommended that for the purpose of securing prompt acclimatization, selection should have reference to the normal behavior of the plants rather than to new characters, or to especial excellence in particular characters.

It was found that incomplete acclimatization renders the plants unusually susceptible to differences of external conditions and this is explained by the facts that fertility and early bearing depend upon the habits of branching which the individual plants may adopt and that these habits are readily influenced by environment. The appearance in the Egyptian fields of numerous hybrids between the Egyptian varieties and the Upland varieties is the source

of additional diversity. It is explained that cotton flowers at Yuma are visited by insects that are apparently more active than at other points where cotton experiments have been carried on, and it is considered that these insects will render it practically impossible to maintain pure stocks of Egyptian seed if Upland cotton is grown in the same localities.

It was observed that hybrid plants at least in the first generation are more fertile than the pure Egyptian and produce longer and stronger lint. The production of very high grades of lint from first generation hybrids and their extreme vigor and productiveness seem to warrant their cultivation and for this purpose to obtain hybrid seed in commercial quantities. As certain characters of the Egyptian cotton are strongly prepotent, especially in the first generation, the production of fields of hybrid plants is considered advisable. It is pointed out that if Egyptian were crossed on the small Kekchi-Upland type the young hybrids could readily be distinguished from the Kekchi plants and these removed in thinning. To recognize the young hybrids among Egyptian seedlings is regarded as much more difficult if not actually impossible.

Attention is called to the fact that while the utilization of hybrids is a possibility, hybrids in fields of Egyptian cotton are a distinct disadvantage. The elimination of hybrids is quite difficult because many of them show no perceptible differences in their growth to distinguish them from the pure Egyptian plants before the involucres and floral buds have developed. The removal of the hybrid plants, however, must take place as soon as they begin to flower in order to prevent their pollen from infecting the next generation. To reject the seed of these plants does not completely purify an Egyptian stock that has once been hybridized.

The results of these observations are taken as making it evident that Upland cotton must either be excluded from regions when Egyptian cotton is to be grown or local sources of supply of pure acclimatized Egyptian seed must be established and very carefully guarded from contact with Upland cotton. If Egyptian cotton growing is to be placed on a commercial basis, the results here discussed also indicate that it is not sufficient to complete the process of acclimatization of Egyptian cotton in any one locality if this seed is to be planted afterwards in any other localities. The need of adjustment to local conditions must be taken into account whenever the crop is to be extended to a different district.

Cotton growing in Arizona, R. W. CLOTHIER (*Arizona Sta. Bul. 60, pp. 426–431*).—Experiments seem to indicate that the Egyptian cotton is the best adapted to Arizona conditions. Samples of Mit-afifi fiber grown at the station and submitted to the Lowell Textile School for tests of quality were found to be 14 per cent stronger than Egyptian-grown fiber and there was 15 per cent less waste. The maximum yield at the station farm, 2,200 lbs. of Mit-afifi seed cotton per acre, was obtained upon a heavily irrigated plat.

The article also contains a digest of data previously noted from Bulletin 128 of the Bureau of Plant Industry of this Department (E. S. R., 20, p. 136) and from Circular 29 of the same Bureau (E. S. R., 21, p. 330).

Cotton production, 1908, D. C. ROPER (*Bur. of the Census [U. S.], Bul. 100, pp. 52, dgms. 4, maps 12*).—This publication presents a summary of cotton crops of the United States from 1899 to 1908, and treats especially and in detail of the crop of 1908. In addition, statistics on the world's production of cotton are given and the relation of the Government to the cotton industry and the commercial and industrial importance of American cotton are discussed.

The figures finally compiled for the crop of 1908, including linters an half bales, show a total production of 13,432,131 bales. Expressed in 500-lb. bales

the crop of 1908 amounted to 13,587,306 bales; of 1907, 11,375,461 bales; of 1906, 13,595,498 bales; of 1905, 10,804,556 bales; and of 1904, 13,679,954 bales. The crop of 1908 is the third largest ever produced, that of 1904 being the largest and that of 1906 standing next. Notes are given on the estimation of unginned cotton, linter cotton, and extension of the cotton-growing area, together with tables showing the status of the cotton industry in different States.

At the close of February, 1909, the stocks of cotton in the country amounted to 5,263,349 bales, of which 1,820,033 bales were in the hands of manufacturers, 367,959 bales still held by the producers, 2,238,224 bales stored in independent warehouses, 542,543 bales in the hands of transportation companies, and 294,590 bales controlled by other holders. From September 1, 1908, to February 28, 1909, inclusive, 6,566,571 bales were exported. The indicated consumption in this country for the 6-month period ended February 28, 1909, was 2,534,040 bales, including 15,066 bales destroyed by fire.

Potato culture, T. Remy (*Der Hackfruchtbau.—I, Der Kartoffelbau. Berlin, 1909, pp. VI+177, figs. 21*).—This book is pubilshed as part 1 of a series dealing with the culture of hoed crops. The extension and importance of growing hoed crops are discussed and a general treatise on potato culture is presented. The history of the potato is related and the chemical composition, culture, storage, and preparation for market of the crop are described.

Soy beans, C. V. Piper and H. T. Nielsen (*U. S. Dept. Agr., Farmers' Bul. 372, pp. 26, figs. 6*).—This describes the climatic and soil requirements of the soy bean, gives full cultural directions, and discusses the use of the crop for hay, pasturage, ensilage, and as feed in the form of grain. Descriptions are given of the following varieties: Mammoth, Hollybrook, Ito San, Geulph, Buckshot, Ogemaw, Wisconsin Black, Wilson, Meyer, Austin, Haberlandt, and Riceland. Notes are also given on growing the soy bean in combination with other crops and on storing soy-bean seed.

Improved seed wheat, A. M. Ten Eyck (*Kansas Sta. Circ. 3, pp. 12, figs. 2*).—During the past year, variety tests were conducted with 82 samples of wheat. The hard red winter wheats which were distributed were Kharkof No. 382, Turkey Red No. 380, Turkey Red No. 570, Malakoff, Bearded Fife, Defiance, Crimean No. 1125, Hard Red Winter No. 839, and Ghirke, and the soft wheats distributed were Zimmerman, Fultz, Currell, Fulcaster, and Mediterranean. Descriptions of these varieties are given.

Reports from growers indicate that the Kharkof and Turkey Red wheats distributed by the station are superior to much of the wheat now commonly grown in the State in vigor, drought resistance, early maturing qualities, greater absence of lodging, and in some cases somewhat greater resistance to the Hessian fly.

Second report of the Nebraska seed laboratory, E. M. Wilcox and Nelle Stevenson (*Nebraska Sta. Rpt. 1908, pp. 143–158*).—In continuation of work previously noted (E. S. R., 21, p. 435), 701 seed samples were received during the fiscal year ended July 1, 1909. The samples came from 13 States, about one-half being from Nebraska. The results of the examination and of the purity and germination tests are presented in tabular form.

The frequency of occurrence of 163 kinds of weed seeds in the seed of alfalfa, clovers, flax, and grasses and grass mixtures is presented in an extended table. Special tables give the names and frequency of occurrence of the various kinds of weed seeds found in alfalfa, red clover, and awnless brome grass seed. In 249 samples of alfalfa seed, 98 different weeds were found, green foxtail, found in 151 samples, and Russian thistle, found in 75 samples, being the most common. In 138 samples of red clover, 83 different weeds were found, green fox-

tail, found in 113 samples, being the most common. In 11 samples of awnless brome grass, 14 different weeds were found, cheat, found in 8 samples, being the most common.

Constant problems in modern agriculture, K. von Rümker (*Tagesfragen aus dem modernen Ackerbau. Berlin, 1909, pp. VII+598, figs. 2*).—This book is made up of 10 numbers of a publication appearing irregularly since 1901. The first number has reference to soil and its cultivation, the second to the use of fertilizers, the third to barnyard manure and green manuring, the fourth to crop rotations, the fifth to the proper selection of varieties for certain conditions of soil and climate, the sixth to variety selection of hoed crops and the methods of variety testing, the seventh to seed growing and seed growers' associations, the eighth to seed and its care, the ninth to weed destruction, and the tenth to the harvest and the storing of crops. Bibliographies on a number of the different subjects are included.

[Agricultural products of Japan], C. Shimooka (In *Agriculture in Japan. Tokyo: Govt., 1908, pp. 157–239*).—These pages treat of the staple and special field crops grown in Japan.

HORTICULTURE.

The inheritance of color in the seeds of the common bean (Phaseolus vulgaris), R. A. Emerson (*Nebraska Sta. Rpt. 1908, pp. 65–101, figs. 4*).—This is a further report upon the author's hybridization studies of beans, some of the results of which have been noted (E. S. R., 16, p. 563). In this paper the numerical relations in respect to color inheritance secured with the various hybrids are presented and discussed, both with reference to Mendelian principles and in connection with the results reported by other investigators along the same line.

In the many crosses made illustrating the inheritance of pigment in bean seeds, the presence and absence of pigment were found to constitute an allelomorphic pair inherited in typical Mendelian fashion (E. S. R., 13, p. 744) Certain exceptions which occurred are attributed to the small numbers dealt with in those cases.

In respect to total and partial pigmentation, the writer finds that the latter condition usually appears around the "eye" of the seed, being confined to a very small spot about the hilum in some races and covering as much as four-fifths of the surface of the seed in others. He is of the opinion that there are no distinct factors for pigmentation about the eye and for pigmentation of the back of the bean. "It is simply a matter of whether the pigment extends over the entire surface of the seed or only over a part (large or small) of it." When totally pigmented beans were crossed with partially pigmented (eyed) beans, total pigmentation occurred exclusively in the first generation hybrids, the eyed form reappearing in the second generation hybrids and breeding true in subsequent generations. Of the totally pigmented second generation hybrids some have bred true while others on being self-fertilized yielded both totally pigmented and eyed forms.

In a number of crosses of eyed beans with nonpigmented (white) beans, the first generation hybrid plants produced totally pigmented seeds. In the second generation hybrids of these crosses totally pigmented, eyed, and white seed were produced. On the other hand, these same white races when crossed with totally pigmented ones yielded no eyed individuals in the second generation hybrid plants. The conclusion is reached that total pigmentation is latent in these particular races of white beans, such as the Davis, Jones Stringless, and Navy, Mottled pigment-pattern was dominant to self-color, both conditions

following as a whole Mendelian numerical relations in subsequent generations. Certain white beans crossed with self-colored ones produced mottled offspring in the first generation of hybrids, and mottled, self, and white individuals in the second generation of hybrids. Other white beans similarly crossed gave only self-colored first generation hybrid seeds, which fact the writer points out as an indication but not proof that mottling may be latent in some white beans and not in others. In the tests here reported crosses of various self-colored races gave only self-colored offspring.

The paper concludes wih a discussion of the theories regarding mottling, relation of mottling to color hypostasis, and the relation of color hypostasis to albinism.

The importance of uniformity of varietal character in vegetable seeds, W. W. Tracy (*Market Growers' Jour., 5 (1909), No. 18, pp. 2-4*).—In this paper the author calls attention to the importance of using seed which will develop into plants of identical varietal character, points out some of the difficulties which arise in selecting such seed, and outlines methods for carrying on seed selection.

Manurial experiments in onion cultivation, L. Jervis (*Bul. Dept. Agr. Bahamas, 4 (1909), No. 3, pp. 88-91*).—Data are given of some demonstration experiments with onion fertilizers, commenced at the station in 1908.

Winter onions in the Southwest, E. L. Crane and R. H. Forbes (*Arizona Sta. Bul. 60, pp. 451-455*).—A popular account of onion culture in southern Arizona discussing soils, arrangement of ground, methods of planting, irrigation and cultivation, insect pests and diseases, varieties, harvesting and marketing, costs, yield and profit.

Report of the horticulturist, J. E. Higgins (*Hawaii Sta. Rpt. 1908, pp. 42-50, pls. 2*).—The fruit shipping investigatons were continued as the chief work of the year. As a result of the experiments conducted in 1907 and previously noted (E. S. R., 20, p. 538), commercial shipments of pineapples were made to Denver and Chicago during the following year. The station tested 3 promising orchard cover crops, of which the cowpea makes the quickest and most luxuriant growth but is quite susceptible to the attacks of aphis. The pigeon pea required a much longer time to come to maturity and is difficult to plow under when full grown. The jack bean, a plant of lower growth and less rambling habit than the cowpea, makes a good cover and is quite free from insects. Such orchard insects as scales, mealy bugs, and aphis were held in check by using kerosene emulsion and by the use of a sticky mixture to keep ants from the trees.

Different stocks are being tested in the citrus orchard, including the rough lemon, shaddock, sweet orange, and pomelo, and which in vigor of growth correspond to the order named above, the rough lemon making a very strong growth and far excelling all the other stocks. A list is given of 43 varieties of bananas now growing on the station grounds.

Experiments were made in the budding of mangoes. Of the Alphonse buds 80 per cent have grown, but the results with some other varieties are less favorable. It appears that the mango has more than one season of active growth. Budding to be successful must be done in the early part of these active growth periods. Experiments in transplanting 2 or 3-year-old mangoes seemed to justify the handling of the mango as a nursery tree. Inarching, although more expensive than budding, appears to be the surest means of propagating fine varieties of mangoes. Shipments of young trees by mail from the Bureau of Plant Industry of this Department to the station indicate that only trees with firm wood and a dormant terminal bud can be successfully shipped by this

method. The season of flowering of the mango in Honolulu has been noted for several years. Records made in 1906–1908 show the general blooming season to have been a month earlier in each succeeding year. In spraying for the control of mango blight with several strengths of Bordeaux mixture to determine what strength could be used with safety, 6 lbs. each of copper sulphate and lime and 50 gals. of water gave the best results, more than 5 lbs. of lime being necessary to prevent injury from free copper. The report concludes with statements relative to plant acquisitions and distributions and miscellaneous work.

Phenological notes for 1908, CHARLOTTE M. KING ET AL. (*Trans. Iowa Hort. Soc., 43 (1908), pp. 276–296*).—Records for 1908 are given by a number of observers from different parts of the State, showing the dates of first blooming of trees, shrubs, and flowering plants.

Top working fruit trees, O. B. WHIPPLE (*Colorado Sta. Bul. 147, pp. 3–16, figs. 7*).—This bulletin contains popular directions for topworking both old and young fruit trees.

The farmers' orchard, J. TROOP and C. G. WOODBURY (*Indiana Sta. Circ. 17, pp. 42, figs. 36*).—A popular discussion of the home orchard, with special reference to apple culture. Consideration is given to the selection of site, soil, and varieties, planting operations, pruning and cultivation, and the protection of the tree and fruit from attacks of its most common diseases and insect enemies. The circular concludes with suggestions for renovating neglected home orchards.

The St. Everard apple (*Gard. Chron., 3. ser., 46 (1909), No. 1191, p. 276, fig. 1*).—A brief illustrative description is given of the St. Everard apple which is a seedling from the Cox Orange Pippin crossed with Margil. The fruits, which are of medium size and round in shape, are described as being richly flavored and ranking as a first-class dessert apple.

Foundations of American grape culture, T. V. MUNSON (*Denison, Tex., 1909, pp. 252, pls. 89, figs. 13*).—This work is the outgrowth of the author's experience of over 30 years as a grape investigator and practical viticulturist. During this period his chief object has been to collect and test the best wild and cultivated varieties, to cross and hybridize them, and to produce new varieties of the best possible qualities, with a view to filling out an ideal list of varieties which shall furnish a succession of fruit throughout the summer months. In addition, an attempt has been made to provide the best possible resistant graft stocks upon which to graft Vinifera varieties.

The present work embodies to a large extent the author's earlier reports on the subject and brings his results up to date. During the course of his investigations the botany of North American grapes has been thoroughly worked over, and it is believed that the exhaustive and complete descriptions and classification given in chapter 1 will prove of value to botanists, as well as to viticultural students. The minute description of each species concludes with a number of viticultural observations and remarks. Chapter 2 is, as a whole, a short treatise on the breeding of varieties of grapes. Succeeding chapters take up the description of varieties, adaptation of varieties, how to start a vineyard, protecting the vineyard from insects and fungi, disposition of the crop, and the grape for home adornment, shade, fruit, and health.

In the preface the author gives a sketch of his career as a grape breeder, together with a résumé of his educational work on American grapes and their development.

Investigations on the question of manuring of grapevines, P. LIECHTI (*Landw. Jahrb. Schweiz, 23 (1909), No. 9, pp. 523–528*).—A number of cooperative experiments are being carried on in several Swiss vineyards to determine the value of commercial fertilizers as an adjunct to and as a substitute for

stable manure. Results thus far secured indicate that stable manures can be displaced by commercial fertilizers containing similar kinds and amounts of plant foods, and that nitrate of soda, the only fertilizer thus far tested in connection with stable manure, can be so used at an increased net profit. A rotation of manure in one year and commercial fertilizers the next year seems advisable.

Statistics on grape and olive products for the year 1908 (*Estadística de las Producciones Vitícola y Olivarera en el Año 1908. Madrid: Junta Agronómica, 1909, pp. 9*).—A statistical report showing the approximate production of grapes, wine, olives, and olive oil in various regions and provinces of Spain for the year 1908.

Italian lemons and their by-products, I.—The Italian lemon industry, G. H. Powell (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 160, pp. 7–33, pls. 3, figs. 3*).—This paper contains an account of the present status of the lemon industry in Italy, together with methods used in growing, marketing, and distributing the crop. Statistics showing the extent and commercial importance of the industry and of the trade in lemons and lemon by-products with this country are included.

A companion paper on The By-Products of the Lemon in Italy, by E. M. Chace, is noted on page 12 of this issue.

Practical manual of coffee and cacao culture in the Belgian Kongo (*Manuel Pratique de la Culture du Caféier et du Cacaoyer au Congo Belge. Brussels: Govt., 1908, pp. 96, pls. 7, figs. 21*).—Part 1 of this work, which consists of a practical manual especially prepared for prospective planters in the Kongo, treats in detail of coffee culture, the following phases being discussed: Species and native varieties, climates and soils adapted to the principal species, selection of varieties, propagation, selection of site, preparation of the soil, planting operations, shading and windbreaks, fertilizers, pruning, plantation renewal, harvesting and preparing the coffee, marketing, and diseases and other enemies and their control. Part 2 discusses the culture of cacao in a similar manner.

Tea culture in Java (*Ber. Handel u. Indus., 13 (1909), No. 4, pp. 123–137*).—This is a consular report on the Javanese tea industry relative to its history and present status, methods of culture and manufacture, and statistics of production and commerce.

Tea manufacture, C. Shimooka (In *Agriculture in Japan. Tokyo: Govt., 1908, pp. 300–308*).—A sketch of the history and present condition of tea manufacture in Japan and Formosa.

Progress and prospects of date palm culture, R. H. Forbes (*Arizona Sta. Bul. 60, pp. 433–437, fig. 1*).—This paper consists of a popular summary of experience gained in the planting and care of date palms in Arizona since the establishment of the cooperative date palm orchard at Tempe in 1899. It discusses soils, localities, cutting and transplanting suckers, enemies, production, varieties, and planting seed. The date palm is considered valuable not only for its own products, but as a means of protection for less hardy plants. The wholesale planting of date palms is not recommended, however, since the question of varieties best suited to the region is still in its experimental stage.

History of gardening, C. Ranck (*Geschichte der Gartenkunst. Leipsic, 1909, pp. 100, figs. 41*).—A short historical sketch of garden design, with chapters on the utilization of old ideas in modern gardens. Succeeding chapters of the work deal with the garden in ancient periods and in the Middle Ages, the garden of the Italian Renaissance, the French garden, the landscape garden, the modern English home garden, and the new German garden. A brief bibliography is appended.

FORESTRY.

The influence of forest cover on the temperature of the soil at different depths, E. Cuif (*Bul. Soc. Sci. Nancy, 3. ser., 10 (1909), No. 1, pp. 51–65, pls. 4*).—This paper contains a summary of the results and conclusions thus far secured at the Nancy Forestry Station on the above line of investigation. The geothermic observations were carried on in the forest domains of Amance and Élieux, by methods which are described. Besides comparing the temperatures of exposed soils and those under forest cover, observations were also made of soil temperatures under different kinds of forests.

The data secured at Amance led to the following conclusions: The forest soil under deciduous stands is about ½° C. warmer in winter and about 3° colder in the summer than exposed soil, for all depths up to 80 cm. The variations in the soil temperature are about 3–4° less under the forest cover than outside of the forest. For all the depths the presence of a deciduous forest is practically the same whether the stand is high-standard or reserve sprout forest. In the summer, other conditions being equal, the soil is about ½° cooler under a reserve sprout forest 16 years of age than under a high-standard forest 100 years old. With reference to the daily variations of the temperature of the air and soil under forest and outside of forest, the studies led to the conclusions that the amplitude of the daily oscillations of the temperature of the soil at a depth of 20 cm. is relatively very feeble when compared with the daily oscillations of the temperature of the air over exposed soil. The presence of the forest appears to reduce the temperature about 1°. At a depth of 80 cm. these daily oscillations are practically inappreciable, both under forest conditions and outside of the forest. The maximum daily temperature of the air over exposed soil occurs about 2 o'clock in the evening, while that of the soil temperature at a depth of 20 cm. is reached at about 6 o'clock in the evening.

The observations made at Élieux led to similar results. The results as a whole confirm the conclusions reached by stations in other countries.

Investigations on the pruning of forest trees, E. Zederbauer (*Centbl. Gesam. Forstw., 35 (1909), No. 10, pp. 413–427, pl. 1*).—The effect of pruning at different times of the year and different methods of pruning forest trees, including the beech, oak, Douglas fir, and spruce, was studied for a number of years. The details are given of the work, together with the practical deductions made.

Contrary to the common opinion that fall and winter are the best times for pruning the trees, the present investigations show that pruning is less injurious to the trees when carried on in the early spring, at which time an active development of healing tissue takes place. When the wounds are covered with tar, however, pruning can be carried on in the fall without much danger of disease entering the wounds. With the coniferous trees the exuding pitch answers as a protection for the wounds.

Fall pruning usually results in a brownish discoloration of the bark about the wound, thereby increasing its size. This was more noticeable with the hardwood species. The smallest amount of subsequent injury is experienced by the tree when the cuts are made smooth and close to the trunk. The pruning of dry limbs does not exert a harmful influence on the development of the tree, but the removal of a considerable number of green limbs checks the growth of the tree to a greater or less extent.

Silvical leaflets (*U. S. Dept. Agr., Forest Serv. Silv. Leaflets, 43–44, pp. 4 each*).—These leaflets discuss, respectively, the red or Norway pine (*Pinus resinosa*), and the jack pine (*P. divaricata*), their range, climate, associated species, habit, soil and moisture, tolerance, growth and longevity, susceptibility to injury, reproduction, and management being considered.

The natural pine forests on the Ulea River, North Central Finland, M. P. Price (*Quart. Jour. Forestry, 3 (1909), No. 4, pp. 311–320, pls. 3*).—This is a brief descriptive account relative to the conditions under which these forests flourish, the silvicultural methods employed in their management, and the economics of their conversion into lumber.

Experiment with seed of Pinus sylvestris, F. Story (*Quart. Jour. Forestry, 3 (1909), No. 4, pp. 326–329*).—The comparative merits of Scots pine seed from different countries is being tested by various experiment stations in Europe, the seed having been previously husked and cleaned at the Eberswalde Station, from whence it was distributed to the different countries. A record is here given of the work conducted at the University College of North Wales, and showing the number and average height of 2-year-old seedlings obtained from the seed of various countries.

Commercial importance of the White Mountain forests, P. W. Ayres (*U. S. Dept. Agr., Forest Serv. Circ. 168, pp. 32, map 1*).—In this circular data are given and discussed showing the importance of the White Mountain forests as a source of timber supply, their need of protection from fire, as an influence on water power and on navigation, and as a place of health and recreation.

Forest conditions in the Crow's Nest Valley, Alberta, H. R. Macmillan (*Dept. Int. Canada, Forestry Branch Bul. 5, pp. 22, pls. 12, maps 2*).—This bulletin comprises the results of a study of the Crow's Nest Valley, which region is believed to be for the most part typical and representative of the eastern slope of the Canadian Rockies. Consideration is given to the topography, soils, elevation and the original forest on this area, and the present conditions are discussed relative to the condition of the timber lands, lumbering and mining operations, and agricultural possibilities. A number of measurements are also given, showing the rate of growth of Engelmann spruce, lodgepole pine, and Douglas fir. The report concludes with suggestions for the reforestation and management of the area.

The forest trees of Canada (*Canad. Forestry Jour., 5 (1909), No. 3, pp. 130–136*).—A list is given of some 141 species of trees native to Canada, including their common and botanical names and geographic distribution.

Report of the superintendent of forestry, R. H. Campbell (*Rpt. Supt. Forestry Canada, 1909, pp. 96, pls. 13*).—This consists of a general report of the work of the forestry and irrigation branch of the Canadian Department of the Interior for the year 1908–9, and of the reports of the officials in charge of the different divisions of the work.

Resistant eucalypts for planting in southern Arizona, J. J. Thornber (*Arizona Sta. Bul. 60, pp. 411–417, figs. 2*).—Notes are given on several species of eucalypts recommended for planting in southern Arizona.

[Rubber investigations at the Hawaii Station], E. V. Wilcox (*Hawaii Sta. Rpt. 1908, p. 11*).—The chief results from the rubber investigations of the year have been previously published (E. S. R., 20, p. 245).

Experiments in planting Hevea rubber seeds indicated that they germinated and grew best when the shells were previously removed and the seeds planted in clean sand. The herring-bone system of tapping Ceara rubber trees gave quite favorable results, as many as 30 consecutive tappings being made by excising a thin slice of bark from the old wound. A good flow of latex was obtained during the whole period. The use of a water bag, or an ammonia bag, was found to increase the relative amount of first-grade rubber as compared with scrap rubber. Some difficulty experienced in coagulating the latex was overcome by the addition of hydrogen peroxid and sulphuric acid. Considerable difference was noted in the amount of latex obtained from yearling trees,

which point is probably of value in indicating the trees which should be preserved in the permanent plantation.

[Pot experiments with fertilizers for rubber], ALICE R. THOMPSON (*Hawaii Sta. Rpt. 1908, pp. 62–64*).—A fertilizer experiment was made with rubber plants, the wire-basket method devised by the Bureau of Soils of this Department being used.

The results for Para rubber show that where manure, sodium nitrate, or lime was the single fertilizer, transpiration increased materially. Combinations of acid phosphate and potassium sulphate gave a large increase, but acid phosphate in other combinations either decreased the transpiration or gave but little increase.

In the work with Ceara rubber the best results were obtained with lime, sodium nitrate, and the two combinations, sodium nitrate and potassium sulphate, and sodium nitrate, potassium sulphate, and acid phosphate. Manure alone and potassium sulphate alone gave fair results. The experiments as a whole indicate that sodium nitrate used alone is a good fertilizer for rubber trees, while acid phosphate appears to have some deleterious effect upon them.

Caoutchouc and gutta-percha in the Dutch East Indies (*Ber. Handel u. Indus., 13 (1909), No. 4, pp. 137–147*).—A consular report on the rubber industry in the Dutch East Indies, relative to its extent, varieties grown, exploitation, and commerce.

Ecanda rubber (Raphionacme utilis) (*Roy. Bot. Gard. Kew, Bul. Misc. Inform., 1909, No. 8, pp. 321–325, pl. 1, figs. 3*).—This is a further report on this recently discovered tuberous rubber plant (E. S. R., 20, p. 545), relative to its mode of growth under natural conditions and its exploitation in Angola, together with notes on the growth of seedlings being studied at the Kew gardens.

DISEASES OF PLANTS.

The development of disease-resistant plants, G. M. REED (*Ann. Rpt. Mo. Bd. Hort., 2 (1908), pp. 284–296*).—A summary is given of various investigations that have been carried on as to the prevention of plant diseases by the development of disease resistance on the part of the host. A considerable number of instances are quoted in which some degree of resistance has been attained, either by selection of plants that have withstood attack or by crossbreeding varieties known to be resistant with susceptible ones and selecting the resistant progeny.

Some plant bacterial diseases, W. G. SACKETT (*Southwest. Stockman, 28 (1909), No. 15, pp. 1, 4, 5*).—An account is given of a bacterial disease of alfalfa and of pear blight.

The alfalfa disease has been previously reported (E. S. R., 18, p. 553), and further investigations have confirmed the conclusion that it is of bacterial origin. Its presence can be recognized, it is said, by the short sickly growth of the first crop and the absence of the deep green color characteristic of a thrifty stand. A close examination of the stems show them to be shriveled and blackened for 2 or 3 in. from the ground, the infection attacking the plants next to the soil and working up the stem. As the disease progresses it produces a watery, semitransparent, brownish appearance of the tissues, which turn black with age. The leaves attached to the diseased part of the stem usually show the watery yellow color at the base and especially at the base of the petioles. One-year-old plants exhibit blackened areas in the crown and black streaks running down into the tap root. As the plant grows older the blackening increases until the whole crown is involved, and either the crown buds are destroyed or the root is no longer able to perform its functions.

So far as the author's observations have gone, the disease appears to run its course with the first cutting. Little or no trace of the disease may be found during the remainder of the season, but the following spring an aggravated outbreak may be expected. The disease apparently does not kill many plants the first year, but they begin to die after the blight has been prevalent more than one season, and after 2 or 3 years the stand is practically worthless. It is thought that there is some relation between this disease and the pasturing and irrigation of the alfalfa fields. The subject is to be given further investigation.

The author describes the pear blight, giving its characteristics, means of spread, and methods for prevention and treatment.

Plant diseases, A. E. Collens (*Dept. Agr. Trinidad, Bul. Agr. Inform., 1909, n. ser., No. 61, pp. 33–43*).—The author briefly describes the attack of *Eutypa erumpens* on cacao, the fungus proving a destructive parasite. In addition to this host it is also known to attack banyan trees, mangoes, litchi trees, and various forest species. The presence of the fungus may be recognized by the occurrence of irregular black patches on the bark with a dull grainy surface.

Notes are given on the occurrence of *Diplodia cacaoicola* on grape cuttings and *D. maydis* on Indian corn. The fruiting stage of *Nectria theobromæ* has also been found on exposed roots of *Gliricidia maculata* and stems of mangoes and avocados, all of which were growing near cacao trees affected by the disease.

A tabulated account is presented of the fungus and insect pests of cacao, in which descriptions are given of the parts affected and the symptoms, with suggestions for control. Similar data are given for the principal diseases of sugar cane.

The life history of the cedar rust fungus, F. D. Heald (*Nebraska Sta. Rpt. 1908, pp. 103–127, pls. 13, map 1*).—Attention is called to the general prevalence of cedar rust throughout the eastern half of the State and the relation of this disease to apple rust. The great abundance of the disease in Nebraska is said to be due, in part at least, to the general practice of employing cedars as ornamental trees or for wind-breaks, and also the extensive planting of such varieties of apples as Wealthy and Jonathan, which are especially susceptible to the disease.

The cedar rust fungus (*Gymnosporangium juniperi-virginianæ*) spends one stage of its life history on the cedar, producing the so-called cedar apples, the other upon the leaves and fruit of the apple tree. The different stages of the fungus are described at length, and on the basis of his observations, the author summarizes the life history of the fungus, stating that the galls are produced on the cedar in May and that the teliospores germinate and produce sporidia which infect the apple trees during the next few days. The first æcidia become mature during July and viable spores are produced during this and the two following months. These spores infect the cedar, but no visible signs can be noted. The mycelium apparently remains dormant during the winter and with the resumption of growth in the spring the fungus stimulates the cedar at the point of infection and the result is the formation of cedar apples, which first become visible in the month of June. These cedar apples grow throughout the summer and fall, remain dormant during the winter, and with the return of favorable conditions in the spring produce the characteristic gelatinous masses. From this it will be seen that 23 months elapse from the time of the infection of the cedar to the period when the resultant galls produce the gelatinous spore masses.

Spraying experiments have been carried on with varying degrees of success, and it is said that the practical application of spraying cedars for the preven-

tion of cedar apples must depend largely upon the local conditions. The reduction of the number of galls is not sufficient to be of much value in preventing the infection of adjacent apple trees, but if the life of valuable cedars is threatened by the abundance of the fungus, spraying would prevent their material injury.

The influence of chemical stimulation upon the production of perithecia by Melanospora pampeana, F. D. Heald and Venus W. Pool (*Nebraska Sta. Rpt. 1908, pp. 129-134, pls. 2*).—An account is given describing the relationship found to exist between *M. pampeana* and certain species of Fusarium and other fungi. This fungus was first isolated while studying the fungi connected with moldy corn, and the perfect fruits of the fungus were found growing among hyphæ of *Fusarium moniliforme*.

Careful examination of hanging drop cultures of Fusarium and Melanospora failed to reveal any attachment between the two, but there was apparently a chemical stimulation. The mycelial growth produced by *Basisporium gallarum* and *F. moniliforme* showed that if an old culture was used the formation of perithecia was entirely inhibited; if younger cultures were used the perithecia were formed in 4 to 7 days.

It is stated that one of the authors has found that *Sordaria longicaudata* produces an abundance of perithecia following a copious growth of Pilobolus on horse manure, but this fungus always fails to produce perithecia on sterilized compost which has not previously borne a crop of Pilobolus.

The life history and parasitism of Diplodia zeæ, F. D. Heald, E. M. Wilcox, and Venus W. Pool (*Nebraska Sta. Rpt. 1908, pp. 1-19, pls. 10, fig. 1*).—A study has been made at the Nebraska Station of various fungi associated with moldy corn, and a report is presented on one of them, *D. zeæ*, which has been shown to be the cause of a very serious dry rot of the ear as well as to affect other parts of the plant.

This fungus produces a condition which is called dry rot, though it is believed that the majority of corn growers refer to such ears as molded. In advanced stages the ear is very light in weight, shriveled, and dark in color, the kernels are either dull or have a dried, brown appearance, and flaky masses of mycelium occur among the grains and on the cob.

The fungus is described at some length, and a statement is given showing that it may cause a loss of at least 50 per cent in weight of ear.

In experiments made to demonstrate the parasitism of the fungus, it was found possible to produce typical disease through puncture inoculations into the husk or into the stalk, or by placing mycelium among the silk at the time of pollination. Little or no infection was found to take place from one ear to another during the same season.

A brief account is given of the distribution of this disease throughout Nebraska, and a bibliography of the literature completes the report.

Investigations on the combating of barley smuts, O. Appel (*Illus. Landw. Ztg., 29 (1909), No. 55, p. 521*).—A report is given on investigations on the possibility of controlling barley smuts by treating the seed with hot air.

In the first lot of experiments dry seed was passed through the drying apparatus, the temperature ranging from 72 to 89° C. Various modifications of this treatment were carried out, the time of passing the seed and the temperature being modified. As a result of the treatment it was found that the vitality of the seed was very materially injured while the smut was not entirely prevented.

In a second series of experiments the seed grain was first soaked for 4 hours in water at a temperature of 35°, after which it was passed through the drying apparatus at temperatures of 58 to 73°. In some other cases the temperature

was reduced to as low as 42°. By this treatment the smut spores were destroyed and relatively little injury was done the seed grain except where the temperature was above 64°. It is believed that this method of treating grain has advantages, and that if the temperature is allowed to go above 60° the duration of treatment should be reduced.

The rust of wheat, E. VERNET (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 30 (1909), No. 40, pp. 428–433*).—An account is given of a number of varieties of wheat that have proved resistant to wheat rust (*Puccinia graminis*).

Fungus maladies of the sugar cane, N. A. COBB (*Hawaiian Sugar Planters' Sta., Div. Path. and Physiol. Bul. 6, pp. 110, pls. 7, figs. 64*).—This bulletin is in continuation of a previous one of the same title (E. S. R., 18, p. 843) and gives supplementary observations upon a number of the diseases previously described, together with notes on some diseases not treated in the former publication.

Particular attention is given to the root diseases of sugar cane. The author states that there are 5 fungi connected with the root diseases, *Marasmius sacchari*, *M. hawaiiensis*, *Ithyphallus coralloides*, *Clathrus trilobatus*, and a fungus as yet undetermined but which is characterized by the occurrence of stellate crystals upon the mycelium. In addition it was thought probable that *Dictyophora* sp. may cause a root disease of cane.

Additional notes are given on the wither tip of the cane leaf, a disease apparently of fungus origin, which, while not serious, may delay the growth of the cane to some extent. The relation between the pineapple disease of cane, due to *Thielaviopsis ethaceticus*, and a disease of pineapples is pointed out, and notes are given on the ring-spot disease of the cane leaf (*Leptosphæria sacchari*) and the eye-spot disease (*Cercospora sacchari*). A possible relation between the rind disease and seed cane is pointed out in that the top shoots containing buds and but little sugar are often discarded or used for planting. These stalks apparently are capable of carrying over the rind disease from one crop to another.

Remedies for the diseases are discussed, after which an account is given of nematodes. Since the previous publication the author states that two additional species have been found parasitic on the roots of cane, one of the species, *Tylenchus biformis*, being described as new.

The bulletin concludes with a discussion of timber rots due to fungi, and suggestions are given for their control.

The root rot of tobacco caused by Thielavia basicola, W. W. GILBERT (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 158, pp. 55, pls. 5*).—According to the author, a root disease of tobacco due to *T. basicola* has caused considerable loss to growers in different sections of the United States.

The fungus attacks the roots, blackening them and causing their decay. If attacked while very young the seedlings are killed, in much the same manner as by the damping-off fungi. In other cases, where the conditions do not favor as severe an attack, the roots are invaded and the plants stunted. The stunted condition of the plant may be often observed in the field where diseased material has been transplanted. When badly diseased plants are set in the field they may turn yellow, wilt, and die to such an extent that often large areas must be replanted.

A description is given of the fungus and historical data are presented on its discovery and distribution, its host plants, etc.

Experiments were carried on to test the practicability of treating seed beds, and it was found that steam sterilization gave best results, followed by surface-fire treatment. Two plats treated with formalin are said to have been but little better than an untreated check plat, but several reasons are advanced to account for the failure.

The conditions conducive to serious injury from root rot are the infection of the seed bed or of the field with the fungus, a heavy soil rich in humus, excessive fertilization, heavy watering, and lack of ventilation of the seed beds.

Cucumber and tomato canker, G. MASSEE (*Roy. Bot. Gard. Kew, Bul. Misc. Inform., 1909, No. 7, pp. 292, 293, pl. 1; Jour. Bd. Agr.* [*London*], *16* (*1909*), *No. 7, pp. 579–581*).—Attention is called to a disease of melons in the United States recently described as due to *Mycosphaerella citrullina* (E. S. R., 21, p. 148), and it is stated that specimens of diseased tomato plants as well as cucumber plants have been examined at Kew and found affected by the same fungus. The conidial form of the fungus is apparently responsible for the rapid extension of the disease. It is shown that the spores from diseased cucumber plants readily infect young tomato plants, as would the spores from tomato plants infect the vegetable marrow plants.

While definite results have not been obtained by investigations, it is thought that thorough spraying with Bordeaux mixture would prevent the occurrence of this disease.

The gummosis of fruit trees, H. BLIN (*Rev. Hort.* [*Paris*], *81* (*1909*), *No. 5, pp. 115–117*).—A description is given of the gummosis of fruit trees, which has proved particularly destructive to peaches, but also attacks apricots, cherries, and plums. This disease has been attributed to various causes, and attention is called to it in the hope that definite investigations will be carried on to determine the specific cause as a preliminary to the discovery of methods of control.

Spraying for apple scab or black spot, C. W. MALLY (*Agr. Jour. Cape Good Hope, 35* (*1909*), *No. 2, pp. 202–211, figs. 4*).—An account is given of spraying experiments for the control of the apple scab (*Fusicladium dendriticum*), which has appeared as a destructive parasite in southern Africa. The experiments were conducted in an orchard which was kept under good cultivation, over 300 trees being used in the test. Bordeaux mixture of the 6 : 4 : 50 formula was used, and 1 to 3 applications given the trees.

The control trees were badly attacked by the disease and at least half the fruit dropped and the remaining portion was badly deformed by the scab. The trees receiving one spraying showed about 60 per cent sound fruit, the trees receiving the first and second sprayings, over 90 per cent, and those sprayed three times were practically free from disease. Where the trees were sprayed three times, however, the fungicide caused some injury, which about counterbalanced the extra margin of sound fruit.

The control of black rot of the grape, C. L. SHEAR, G. F. MILES, and L. A. HAWKINS (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 155, pp. 42, pls. 5, figs. 2*).—A report is given of a series of investigations undertaken to demonstrate the efficiency of the best methods practiced and at the same time to improve if possible methods and mixtures for the control of the black rot of the grape, and also to secure additional knowledge regarding the life history and habits of the black rot fungus (*Guignardia bidwellii*) and other parasitic fungi of the grape. This work was begun in 1906 and has been extended until in 1908 it was carried on in Pennsylvania, Michigan, New York, and New Jersey. A considerable number of fungicides were tested, most of them being various copper compounds, but comparisons were made with lime-sulphur mixtures. The work at the different stations is described at length.

A study of the tables presented shows that where different numbers of applications were made, 5 applications at the proper times gave nearly or quite as satisfactory results as 6, 7, or 8. A Bordeaux mixture prepared according to the 4 : 3 : 50 formula was found as effective in preventing black rot as fungi-

cides containing larger quantities of copper sulphate or lime. Five or 6 applications, beginning when the shoots were about 8 in. to 1 ft. long, generally gave as good results as where 1 or 2 additional earlier applications had been made.

Where unsprayed grapes were a total loss from black rot in 1907, the rot on the sprayed plats was reduced to 28.3 per cent. The next season, 1908, when the rot was almost equally destructive on the unsprayed plats, on the sprayed plats it was reduced to less than 1 per cent, apparently showing a cumulative effect of treatment for the two seasons.

The experiments have shown the necessity of covering the vines thoroughly with a fine spray of properly prepared Bordeaux mixture, and where the black rot is serious or the foliage very heavy it is found desirable to use trailers attached to the spraying apparatus and have the nozzles directed by hand, so as to properly cover the foliage and fruit.

The tests of the various lime-sulphur preparations have not yet been sufficient to determine their value as a preventive of black rot. Neutral copper acetate in the proportion of 1 lb. to 50 gals. of water has been found the best nonstaining preparation for final applications.

Coffee diseases of the New World, G. MASSEE (*Roy. Bot. Gard. Kew, Bul. Misc. Inform., 1909, No. 8, pp. 337–341, fig. 1*).—A technical description is given of a leaf spot disease of coffee due to *Sphærostilbe flavida*. This disease has been known for a number of years and is said to have been reported from several Central and South American countries.

The leaves, young shoots, and fruits are first attacked, circular whitish patches being produced upon the leaves. Leaves that are attacked soon become yellow and fall, and in severe cases the tree may become nearly defoliated. On the young shoots the diseased spots are whitish and more or less elongated. The cortex in such places becomes dry and cracks and finally breaks away in small flakes, leaving the browned wood exposed. On the berries the spots are usually whitish and almost circular in outline.

The fungus spreads rapidly, and it has been found possible to infect young coffee plants by placing ascospores of the Sphærostilbe stage upon the unbroken surface of the leaves. The fungus is carried over from year to year on diseased shoots and on the fruit, whether hanging or fallen from the tree. All infected shoots should be cut out and, together with the diseased fruit and leaves, collected and burned.

Notes are also given on a tap-root disease of the coffee tree, due to nematodes, which is said to be a common disease in the coffee plantations of São Paulo. The tap root seems to be the portion attacked by the nematodes, and presents a very characteristic appearance, being swollen and covered with thickened bark soaked with water. The diseased trees are said to be very conspicuous and readily detected, and as a tree once attacked apparently never recovers, it is recommended that all such trees be uprooted and burned. Treating the soil with carbon bisulphid it is thought will also prove an efficient method of controlling this disease.

Notes on the Hemileia disease of coffee and the resistance of certain species to the fungus, F. C. VON FABER (*Tropenpflanzer, 13 (1909), No. 5, pp. 235–238*).—An account is given of the leaf spot disease of coffee, due to *H. vastatrix*, together with estimates showing the amount of loss that it has occasioned. The peculiar susceptibility of *Coffea arabica* and its varieties to this fungus is pointed out, and a number of species are mentioned as being more or less resistant.

Mulberry diseases, E. J. BUTLER (*Mem. Dept. Agr. India, Bot. Ser., 2 (1909), No. 8, pp. 18, pls. 4, figs. 2; Indian Agr., 34 (1909), No. 8, pp. 249–252*).—Descriptions are given of twig blight of mulberries (*Coryneum mori*), mulberry

leaf spot (*Septoglœum mori*), mildew (*Phyllactinia corylea*), and trunk rot (*Polyporus hispidus*).

Of these diseases the twig blight is probably the most important, as it directly affects the yield of the leaves required in silk culture. The fungus is parasitic on the smaller branches, usually near the base, and is not confined to living trees, but is also found on dead prunings and broken branches on the ground. It is apparently a wound parasite and attention should be paid to the pruning of mulberry trees and the methods of gathering the leaves. In addition to the mulberry, this fungus has been found on a number of other plants, producing symptoms exactly similar to those on the mulberry.

The white pine blister rust, C. R. Pettis (*Forestry Quart., 7 (1909), No. 3, pp. 231–237*).—Attention is called to the introduction in this country of the blister rust (*Peridermium strobi*) which attacks the white pine. This disease is not indigenous to this country, but was imported from Europe on pine seedlings in the spring of 1909. The alternate form, *Cronartium ribicola*, has been reported before and an account given in a previous publication (E. S. R., 18, p. 747).

The presence of the fungus was noted on a large importation of pine seedlings obtained in the spring of 1909 from Germany and its identity established. Subsequently, a conference was held in New York to determine measures for the control of the disease, and a plan has been adopted for the State which includes the inspection of all premises where white pine seedlings have been introduced and the destruction of all infested pines or Ribes plants. It is thought that probably the inspection should be continued for several years.

Note on the biology of Pestalozzia hartigii, C. E. C. Fischer (*Jour. Econ. Biol., 4 (1909), No. 3, pp. 72–77, pl. 1*).—This fungus, which has long been known as an active agent of a seedling disease of several timber trees, is said to attack, both in the nursery and in natural surroundings, seedlings of beech, ash, maple, spruce, and silver fir. It causes constriction on the stem just above the level of the soil and destroys the cambium all the way around the stem.

Hitherto there has been no connection discovered between this species and any of the definite groups of higher fungi, and the author carried on experiments to determine if possible the life history of the parasite. Cultures were made, and it was found comparatively easy to germinate the conidia and grow the fungus. A number of inoculation experiments were undertaken with quite a range of seedlings, but in no case did infection result from the inoculation. It seems probable that some conditions which are supplied in nature were lacking in the experiments. It is thought possible that the cooperation of some other organism is necessary to enable this species to attack actively its host plants. Thus far no form of reproductive organs has been obtained other than those already known.

Fomes lucidus, a suspected parasite, E. J. Butler (*Indian Forester, 35 (1909), No. 9, pp. 514–518, pl. 1*).—The author states that this species, one of the largest and handsomest of the bracket fungi, is widely distributed throughout the world, reaching its greatest development in the Tropics. It has been usually considered a saprophyte, but recent observations on a considerable number of species of trees seem to indicate that it is a common and widespread destructive tree parasite in India and possibly elsewhere.

Wood-destroying fungi, J. Schorstein (*Österr. Forst u. Jagd Ztg., 27 (1909), Nos. 29, pp. 255–257, figs. 10; 31, pp. 272, 273, figs. 15*).—Illustrated descriptive notes are given on a number of the more common fungi which attack timbers of various sorts, 22 species being noted.

Some common plant diseases, W. B. McCallum (*Arizona Sta. Bul. 60, pp. 456–464*).—Directions are given for the preparation and use of fungicides, and popular notes on a number of fungus and bacterial diseases of plants, together with suggestions for their prevention.

Directions for the control of Nebraska plant diseases, E. M. Wilcox and R. E. Stone (*Nebraska Sta. Rpt. 1908, pp. 21–63*).—The symptoms and cause of the different diseases are described and methods given for their control or prevention. The diseases are arranged alphabetically by their prevailing common names, under the various crops which are arranged in a similar manner. Bibliographies containing references to some of the more recent literature are given under the different diseases.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

Biological investigations in Alaska and Yukon Territory, W. H. Osgood (*U. S. Dept. Agr., Bur. Biol. Survey, North American Fauna No. 30, pp. 96, pls. 5, figs. 2*).—Biological investigations made in the interior of Alaska and Yukon Territory in 1903 and 1904 are here reported. Three distinct areas are considered, namely, East Central Alaska (pp. 7–44), the Ogilvie range, Yukon Territory (pp. 45–65), and the Macmillan River, Yukon Territory (pp. 66–92).

The physiography of these areas is described and detailed accounts are given of the animal life of the region, especially the abundance, ranges, and general habits of the game and fur-bearing animals. It is considered that under proper regulations the fur-bearers should increase and that the game animals of Alaska should continue indefinitely to be a source of food and profit to the Territory.

The rabbits of North America, E. W. Nelson (*U. S. Dept. Agr., Bur. Biol. Survey, North American Fauna No. 29, pp. 314, pls. 13, figs. 19*).—This monograph includes all the known hares and rabbits in North America.

Although the commonest of North American mammals, yet within comparatively few years they were represented in collections by extremely scanty and imperfect material. Ninety-seven species and subspecies are recognized, 2 or 3 of which in the light of more satisfactory material may prove unworthy of retention in the list. In the preparation of this monograph, more than 5,500 specimens were examined, of which about 3,500 were skins with skulls, the others odd skulls. Representatives of every species and subspecies recognized are said to have been examined. The revision includes a key to the species and subspecies, maps illustrating their distribution, and a bibliography of the more important papers.

[The introduction of the American robin into England] (*Nature [London], 81 (1909), No. 2078, p. 264*).—An attempt is being made near Guildford, in Surrey, to acclimatize *Merula migratoria*.

Index-catalogue of medical and veterinary zoology, C. W. Stiles and A. Hassall (*U. S. Dept. Agr., Bur. Anim. Indus. Bul. 39, pts. 24, pp. 1807–1893; 25, pp. 1895–1979*).—Part 25 includes titles arranged by authors alphabetically from R to Rizzo, and part 26, those from Roack to Rzewuski.

Zoological yearbook, 1908, P. Mayer (*Zool. Jahresber., 1908, pp. VIII+235+31*).—Bibliographical lists are given, also summaries of the more important literature issued during 1908 relating to the various groups of the animal kingdom.

Our insect friends and enemies, J. B. Smith (*Philadelphia and London, 1909, pp. 314, pl. 1, figs. 121*).—In this work the author discusses the relations of insects to plants as benefactors and as destroyers, to each other, to the animals that feed on them, to weather and diseases that affect them, to other animals, to man as benefactors and as carriers of diseases, to the household, and

to the farmer and fruit grower. The closing chapter is devoted to a discussion of the war on insects.

The rôle of air in the ecdysis of insects, F. KNAB (*Proc. Ent. Soc. Wash., 11 (1909), No. 2, pp. 68–73*).—A brief consideration of this subject.

Contribution to the biology of the Aphididæ, A. MORDWILKO (*Biol. Centbl., 27 (1907), Nos. 17, pp. 529–550; 18, pp. 561–575; 23, pp. 747–767; 24, pp. 769–816, figs. 22; 28 (1908), Nos. 19, pp. 631–639; 20, pp. 649–662; 29, (1909), Nos. 3, pp. 82–96, figs. 2; 4, pp. 97–118; 5, pp. 147–160; 6, pp. 164–182*).—The biology of the plant lice is here considered at length.

Contributions to experimental entomology, W. REIFF (*Jour. Expt. Zool., 6 (1909), No. 4, pp. 553–569*).—The experiments which the author here reports were with *Junonia cœnia*, collected on Long Island.

In regard to the period of pupation at different temperatures for caterpillars reared at out-of-door temperature, he reports as follows: "The time of pupation, that is, the time which elapses between the attachment of the caterpillar and the complete pupa, differs according to the prevailing temperature. At 23° C. pupation took place in from 10 to 12 hours; 18° caused the caterpillars to pupate in 17 hours; 9° in about 48 hours; 6° in 60 hours, and below +4° pupation did not take place at all. The caterpillars, which I subjected for a long time (up to 8 days) uninterruptedly to a lower temperature, varying between 0 and +3°, died, no matter in what stage they happened to be."

From the experiments conducted the author concludes that this species never passes the winter in the northern States as a caterpillar and that all caterpillars die as soon as the temperature sinks to +3° for several days. The pupa is not quite so sensitive to continued cold as the caterpillar, but still is sensitive to a considerable degree. All of the pupæ which were exposed to a constant low temperature (−5° or below) for more than 48 hours, died. "All the pupæ which I exposed to a temperature of 45° for more than 2 hours, or such as were exposed to 44° for more than 5 hours, died. Of all the pupæ which remained in the apparatus 5 hours at 43°, only one later produced a butterfly, but this was a complete cripple. All the pupæ endured very well for several hours a temperature of from 40 to 42°. My method was to expose the pupæ on the first day to a temperature of 40° for 4 hours, the second day to 41° for 5 hours, and on the third day to 42° for 4 hours." The coloration and marking of butterflies bred from pupæ which had been exposed to low temperature were in complete contrast to those not thus exposed. The author considers this species as probably in the act of adapting itself to cold.

Notes on microlepidoptera, with descriptions of new North American species, A. BUSCK (*Proc. Ent. Soc. Wash., 11 (1909), No. 2, pp. 87–103*).—Several biological notes are included in this account.

Anacampsis crescentifasciella is said to have been bred from *Krameria secundiflora* at Dallas and Victoria, Tex. *Olethreutes albiciliana* was bred from the stalks of touch-me-not (Impatiens) collected at Magnolia, Mass. "The larva lives in the hollow stalk and in the succulent pith in the swelled joints; it overwinters as larva and toward spring gnaws a small circular hole in the stalk near a joint, leaving only the extreme epidermis intact as a semitransparent port hole; just inside this it spins a few threads of silk and pupates with its head toward the window, through which eventually the imago issues. In the insectary the first moth issued the latter part of April."

The larva of *Tischeria albostraminea* makes a small, pale straw-colored upper mine in the leaves of oak about Washington, D. C. The mine is normally placed at the edge of the leaf, frequently causing the edge of the leaf to bend over in a small fold. The species has several generations in the vicinity of Washington.

First annual report of the superintendent for suppressing the gipsy and brown-tail moths, A. H. KIRKLAND (*Ann. Rpt. Supt. Suppressing Gipsy and Brown-tail Moths* [*Mass.*], *1* (*1905*), *pp. 161, pls. 17*).—The work conducted in 1905 following the appropriation in May of funds for suppressing these pests is reported.

As against 34 cities and towns covering an area of 359 square miles of territory infested by the gipsy moth in 1900, 124 cities and towns covering an area of 2,224 square miles were found to be infested in 1905. The work with natural enemies is considered at length, the report of the consulting entomologist, C. H. Fernald, the report of the work with insect enemies of these pests by L. O. Howard, and the report of work with fungus parasites of the brown-tail moth, by G. E. Stone, being incorporated.

Second annual report of the superintendent for suppressing the gipsy and brown-tail moths, A. H. KIRKLAND (*Ann. Rpt. Supt. Suppressing Gipsy and Brown-tail Moths* [*Mass.*], *2* (*1906*), *pp. 170, pls. 13*).—The work conducted during 1906 is here reported at length, including the report of the consulting entomologist, C. H. Fernald, the report of the work with insect parasites by L. O. Howard, and an account of the pathology of the brown-tail moth dermatitis, by E. E. Tyzzer.

Third annual report of the superintendent for suppressing the gipsy and brown-tail moths, A. H. KIRKLAND (*Ann. Rpt. Supt. Suppressing Gipsy and Brown-tail Moths* [*Mass.*], *3* (*1907*), *pp. 228, pls. 13*).—The details of the work of supression during the year 1907 and investigations of natural enemies, including a report on parasites by L. O. Howard, are considered at length. In an appended special report on importing parasites are incorporated the individual reports made by American and foreign entomologists following personal investigations of the work under way. The entomologists thus reporting are C. P. Lounsbury, R. Heymons, R. Blanchard and G. Horvath, W. W. Froggatt, A. Séverin, J. Fletcher, E. M. Ehrhorn, E. P. Felt, H. A. Morgan, H. Osborn, S. A. Forbes, J. B. Smith, and M. V. Slingerland.

The Angoumois grain moth, T. B. SYMONS (*Maryland Sta. Bul. 137, pp. 7, figs. 2*).—A popular account of the life history, habits, and methods of control of this pest of stored grain, which is generally disseminated throughout Maryland.

Mosquitoes of Brazil, A. G. PERYASSU (*Os Culicideos do Brazil. Rio de Janeiro, 1908, pp. 407, illus.; rev. in Bul. Inst. Pasteur, 7* (*1909*), *No. 3, pp. 135, 136*).—Detailed descriptions are given of 131 species and 5 subspecies of Brazilian mosquitoes. Eight genera of the subfamily Anophelinæ are represented by 14 species. The distribution of mosquitoes in Rio de Janeiro, observations on the larvæ of 30 species, experimental studies on the biology of *Stegomyia fasciata*, and other data are included.

The work is accompanied by numerous plates.

Chemical observations with the meat fly Calliphora, E. WEINLAND (*Biol. Centbl., 29* (*1909*), *No. 18, pp. 564–577, figs. 3*).—A study of the biochemical processes going on during the cycle of development of the Calliphora.

Further observations on the development of trypanosomes in Glossinæ, KLEINE (*Deut. Med. Wchnschr., 35* (*1909*), *No. 21, pp. 924, 925; abs. in Sleeping Sickness Bur.* [*London*], *Bul. 7, pp. 249, 250*).—This is in continuation of experiments previously noted (E. S. R., 21, p. 785).

Sixty-six days after the flies had fed on infected animals the surviving 20 were placed on sheep, calves, and goats, one to an animal, and a calf and a goat became infected after an incubation interval of 11 days. In another experiment in which 147 freshly caught *Glossina palpalis* were fed for 2 days on 2 sheep infected with trypanosomes and then for the successive periods of 4 days on

different healthy calves, no animals became infected. The experiments were repeated with 200 freshly caught *G. palpalis*, and after 20 days, when the flies had fed on 5 healthy animals without producing illness, they became infective.

Experiments were conducted to determine whether infective flies (*G. palpalis*) convey *Trypanosoma gambiense* to a healthy animal once only (mechanically) or are able to infect many animals, one after another, in the course of several days or weeks. From the results obtained the author concludes that transmission is not merely mechanical but that the Glossinæ are true hosts of the trypanosomes. He succeeded in infecting flies hatched out from pupæ by feeding them on sick monkeys and in thus conveying sleeping sickness to several healthy ones. It is concluded that the developmental period in the flies may be shorter than the 20 days he had assumed it to be from his first experiment.

Further investigations on the etiology of sleeping sickness, KLEINE (*Deut. Med. Wchnschr., 35 (1909), No. 29, pp. 1257-1260, figs. 42; abs. in Sleeping Sickness Bur.* [*London*], *Bul. 9, pp. 321-323*).—In continuation of investigations noted above, 410 flies were fed on infected animals. Of these 22, or 5 per cent, became infective, but as about half die early in captivity the author thinks the percentage may be doubled. The limit of infectivity of the flies has not been determined. A captive *Glossina morsitans*, however, was found to convey trypanosomes after 83 days. Emphasis is placed on the fact that all the author's observations were made on flies bred from pupæ.

Siphonaptera observed in the plague campaign in California, with a note upon host transference, G. W. McCOY (*Pub. Health and Mar. Hosp. Serv. U. S., Pub. Health Rpts., 24 (1909), No. 29, pp. 1013-1022*).—The author presents in tabular form the results of identifications of fleas taken on various small mammals during the campaign against rodents for the purpose of exterminating the infection of plague among these animals in California. There were identified 12,347 fleas representing 18 species. The large majority of fleas were found associated with their proper hosts, but there was some accidental distribution to adventitious hosts. Rat fleas were found several times upon squirrels and the squirrel fleas upon rats.

Some insects injurious to truck crops. The Colorado potato beetle in Virginia in 1908, C. H. POPENOE (*U. S. Dept. Agr., Bur. Ent. Bul. 82, pt. 1, pp. 8, pls. 2*).—This is an account of the investigations of the life history and methods of control of the Colorado potato beetle in the tide water region of Virginia, conducted in cooperation with the Virginia Truck Experiment Station.

This section of Virginia is considered as probably the greatest center for the production of early potatoes in the eastern United States. Two crops are raised in a small portion of this area, but over the greater part only a single planting is made, this being made during the latter part of February and the first of March and the crop of new potatoes being harvested in June. As the early blight does little injury to the plants, the Colorado potato beetle becomes the worst drawback to the culture of the potato in this locality. The methods of control practiced are said to be very crude.

In general the life history agrees with the description by Chittenden previously noted (E. S. R., 19, p. 159). In 1908, 3 generations or broods were reared during the summer and very young larvæ were seen on the tomato at Norfolk as late as September 1. The period of æstivation which generally follows the second generation in this species was shortened to 4 days in the beetles which were carried through the stages at Norfolk. The beetles which pass the winter are usually those of the third generation. On warm days with an offshore wind great numbers of the hibernated individuals are blown or carried out to sea where they perish, the beach often being covered with windrows of the dead beetles.

Insect enemies noted were *Podisus maculiventris* and the usual tachinid; the eggs of the latter being seen on 3 to 4 per cent of the larvæ. Harpaline ground beetles were abundant and *Lebia grandis* is thought to have been a factor in the control of the potato beetle.

A number of experiments performed with a view to discovering the cheapest and most effective insecticide for controlling the pest are reported. "In conclusion it is suggested that at least 3 thorough applications of Paris green, or arsenate of lead, with Bordeaux mixture be made, the first applied about the time that the first eggs begin to hatch, and the later applications at intervals of about 3 weeks. By this method the beetles should be easily controlled and the injury therefrom almost entirely obviated."

The blue-green beetle, J. S. Houser (*Ann. Rpt. Cuban Nat. Hort. Soc., 3 (1909), pp. 52–58*).—While there are 3 species of the Cuban blue-green beetle, *Pachnæus azurescens* is responsible for most of the injury to Cuban citrus products. The biology of this pest is briefly considered. Field experiments are said to have demonstrated that spraying with poisons can not be relied upon to fully control the beetle; that the ordinary spray mixtures of poisons adhere with difficulty to the oily, growing shoots of the citrus plants, and that knapsack sprayers are wholly inadequate for nursery orchard spraying. The collection of adults, the encouragement of birds, the possible spraying with poisons, and the promoting of the general health of the trees are the measures recommended.

Notes on some of the Eucnemidæ of the Eastern States, R. W. Van Horn (*Proc. Ent. Soc. Wash., 11 (1909), No. 2, pp. 54–62, pl. 1, figs. 2*).—An account of the habits of these beetles.

Some species of Calligrapha, F. Knab (*Proc. Ent. Soc. Wash., 11 (1909), No. 2, pp. 83–87*).—*Calligrapha rhoda*, which feeds exclusively upon the hazel (*Corylus americana*), both in the imago and larval stages; *C. rowena*, the food plant for which is unknown; and *C. amelia*, which, in the imago and larval stages, recurs exclusively upon alder (*Alnus rugosa*), are here described as new. *C. philidelphica* is said to live only upon Cornus (*C. stolonifera*).

The sweet potato weevil (*Agr. News [Barbados], 8 (1909), No. 192, p. 282, figs. 4*).—A brief account is given of *Cryptorhynchus batatæ* which attacks sweet potatoes in the field.

A brief note on Chalcodermus collarishorn, J. A. Hyslop (*Proc. Ent. Soc. Wash., 11 (1909), No. 1, p. 40*).—This weevil was bred from seed pods of *Cassia chamæchrista* at Marr's Station, Md.

New Chalcidoidea, J. C. Crawford (*Proc. Ent. Soc. Wash., 11 (1909), No. 1, pp. 51, 52*).—*Leucospis robertsoni* from Florida and *Lariophagus texanus*, parasitic on *Laria* (*Bruchus*) *prosopis*, also bred from stems of *Leucosyris spinosus* at Victoria, Tex., are described as new to science, the latter species representing a new genus.

A new family of parasitic Hymenoptera, J. C. Crawford (*Proc. Ent. Soc. Wash., 11 (1909), No. 2, pp. 63, 64, pl. 1*).—*Vanhornia eucnemidarum* secured from the cells of larvæ of the family Eucnemidæ represents a new family (Vanhorniidæ), genus, and species.

Report of the state entomologist [of Nebraska for 1907–8], L. Bruner (*Rpts. State Ent. and Bot. Nebr. 1907–8, pp. 5–13, figs. 2*).—Brief mention is made of the insects investigated from July to December, 1907, previously noted from another source (E. S. R., 20, p. 1146; 21, p. 249).

Among the more injurious insects investigated in 1908 were the box-elder aphis, melon aphis, strawberry leaf-roller, corn earworm, chinch bug, and several species of social caterpillars including the walnut datana, fall webworm, and white-marked tussock moth. In the nurseries of portions of the State,

Carolina poplars were attacked by the cotton leaf beetle (*Lina scripta*). An entirely new wheat insect, probably an Eleodes, appeared among the wheat fields, the larvæ attacking the seed in the ground before it germinated.

Other insects mentioned are a sawfly (*Monostege rosæ*) which injured cultivated roses, the Colorado potato beetle, potato stalk borer, and cabbage butterfly, and a new grass-infesting scale (*Eriopeltis coloradensis*). A detailed study of the life history of this scale showed it to be at least 2-brooded and capable of becoming a very important pest of the wild-hay crop in the western counties of the State.

Report of the entomologist, D. L. Van Dine (*Hawaii Sta. Rpt. 1908, pp. 17–41*).—Investigations were made of the insects affecting live stock and bee keeping, and in Oahu further work was undertaken on the insects affecting pineapple, cotton, and mangels. The horn fly and sheep-maggot fly (*Calliphora dux*) are discussed and brief mention is made of several important cotton insects, of which a more detailed account is noted below.

The year is reported to have been marked by a decided impetus to the bee keeping industry, the season's crop showing an increase from 600 tons to nearly 1,000 tons, and the honey and wax crop being estimated as worth $100,000. The number of colonies at present in the Territory is not far below 20,000. A list is given of the honey trees and plants found in the Islands.

The mealy bug (*Pseudococcus citri*) has become as serious a pest of the pineapple as is the pineapple scale (*Diaspis bromeliæ*), previously noted (E. S. R., 16, p. 683). Aside from the injury to the plant, the mealy bug injures the fruit directly by its feeding and indirectly by acting as an agent in the spread of the pineapple rot. During the season it was demonstrated that the scale and mealy bug can be controlled in the field and that clean shipments of fruit are possible by proper methods of fumigation.

Trial fumigation of plants before setting them in the field indicates that plants will not stand as large a dosage of hydrocyanic gas as will fruit for shipment. For plants to be set in the field it is recommended that for every 100 cu. ft. of space, 1 oz. potassium cyanid, 2 fluid oz. sulphuric acid, and 4 fluid oz. of water be used, with an exposure of 1½ hours. For fruit for shipment 1½ oz. of potassium cyanid for every 100 cu. ft. of air space is recommended. For field treatment an emulsion of kerosene is recommended for the scale and tobacco dust for the mealy bug.

A revised list is given of the injurious insects of Hawaii.

Report on the insects which affect the cotton plant in the Hawaiian Islands, D. T. Fullaway (*Hawaii Sta. Bul. 18, pp. 5–27, figs. 18*).—Although cotton has not up to the present time been one of the agricultural industries in the Hawaiian Islands, experiments conducted by the station have given remarkably promising results. This investigation of the insects affecting the cotton plant has been conducted in view of the fact that the profit to be obtained from its growth will largely depend upon the extent of the insect injury.

In Honolulu, a stem maggot has been found which attacks the plant soon after germination. Although adults have not been bred it is thought to be a common species, as carnations and pigeon peas have been noticed to suffer from similar attacks. A wireworm which attacks germinating cotton is thought to be *Simodactylus cinnamomeus*. *Agrotis ypsilon* is the cutworm which has been observed to attack cotton most frequently. Cotton suffers more or less from *Aphis gossypii*, and at certain seasons the damage becomes a great handicap to the plant. *Adoretus tenuimaculatus* has injured cotton to some extent through attacking the foliage. The mealy bugs *Pseudococcus virgatus* and *P. filamentosus* are serious pests, the former occurring in the Islands on *Dolichos lablab*,

poinsettia, oleander, violets, litchi, and klu. *P. filamentosus*, which is probably the most destructive coccid in the Islands, attacking hibiscus, mulberry, grape, and citrus trees, has been a pest of cotton for several years.

The worst insect enemy of cotton is the Hawaiian bollworm (*Gelechia gossypiella*) which primarily attacks the boll, although the immature worms sometimes enter the ovary and devour the young ovules preventing the normal forming of the boll, which either drops or opens prematurely, before the lint has been formed. In the boll it causes premature opening, rotting, and soiling of the lint. In a planting where no effort was made to control the pest it was estimated that 50 per cent of the bolls and about 15 per cent of the seeds were infested. For practical reasons the use of artificial remedies is not advised at the present time. The regular destruction of infested bolls by burning; severe pruning, and burning after the last picking in the fall; the collection and burning of all fallen bolls; ginning soon after picking, etc., are recommended. The parasite *Chelonus blackburni* has been bred by the author from this pest. *Heliothis obsoleta* has not as yet been found to attack cotton, although it often infests corn and has occasionally been bred from other plants. Its parasites are so efficient that it is not expected that it will become an important factor in cotton production in the Islands.

The leaf-folding caterpillar *Archips postvittanus* does some injury to the foliage. The larva of the phycitid *Cryptoblabes aliena* has been found upon cotton, an undetermined species of the genus Myelois has been bred from infested cotton bolls, and *Sinoxylon conigerum* has been found to bore in cotton stems.

Under minor pests the author mentions a thrips as being commonly found in the blossoms, but apparently the source of little injury. A red spider (*Tetranychus* sp.) commonly found on the foliage of bolls is probably responsible for some spotting. A psocid and 3 coleopterous species are commonly found about cotton.

Under beneficial insects found in cotton fields, the author mentions a number of lady beetles, Syrphus flies, and several predaceous hemiptera. The importance of strict quarantine measures with regard to imported seed or cotton stock is emphasized. The most promising field for improvement in conditions is thought to lie in cultural methods.

Contribution to the knowledge of the injurious olive insects and their natural enemies, G. Martelli, F. Silvestri and L. Masi (*Bol. Lab. Zool. Gen. e Agr. R. Scuola Sup. Agr. Portici, 2 (1908), pp. 1–358, figs. 151*).—A collection of articles from the entomological laboratory at Portici.

A note is given on the feeding habits (pp. 3–12) and another on the number of generations (pp. 13–17) of the olive fly. The ectophagus hymenopterous parasites of the olive fly observed up to the present time in southern Italy, and their importance in combating this pest, are discussed at length (pp. 18–82). *Dinarmus dacicida*, described as new, and *Eulophus longulus*, *Eupelmus urozonus*, and *Eurytoma rosæ* are the species considered. Tables are included for their separation in larval, pupal, and adult stages. Studies made of the percentage of olive flies parasitized at different localities in Italy are presented and their economic importance and possibilities discussed.

The olive leaf tineid (*Prays oleellus*) and its parasites are considered at some length (pp. 83–184), considerable attention being given to the chief natural causes which prevent the multiplication of the pest. These are taken up under the headings lepidopterous, dipterous, and hymenopterous insects. The classification of the parasites of the olive fly is briefly considered (pp. 185–194). A lepidopterous pest belonging to the family Lyonetiidæ, which lives in the olive leaves, is described as representing a new genus and species, *Œcophyllembius*

neglectus (pp. 195–216). Under the title Observations on the Coccidæ of the Olive and their Parasites in Puglia and Calabria, *Lecanium oleæ*, *Philippia oleæ*, *Aspidiotus betulæ*, and *Pollinia pollini* are considered (pp. 217–296). The fig coccid (*Ceroplastes rusci*) and its natural enemies are also discussed (pp. 296–358).

Garden insects and how to control them, E. D. SANDERSON (*Trans. Mass. Hort. Soc., 1909, pt. 1, pp. 29–38*).—A paper read before the Massachusetts Horticultural Society, January 16, 1909.

Our honey bees, R. SAJÓ (*Unsere Honigbiene. Stuttgart, 1909, pp. 108, figs. 41*).—This is a small handbook on bees, their structure and habits, and the business of bee keeping.

Eri or castor silk, H. M. LEFROY (*Agr. Jour. India, 4 (1909), No. 2, pp. 125–133, pls. 8*).—Eri silk is described as the cocoon of *Attacus ricini*, probably the domesticated form of *A. cynthia* which is found in a wild stage in Assam and in the outer forested slopes of the Himalayas. "Eri silk is domesticated in the Assam valley, where it is grown for local use and, to a limited extent, for export. With Muga silk (*Antheræa assama*) it forms what is known in India as 'Assam silk' as apart from tussur and from mulberry silk. At the present time, eri is not generally cultivated outside Eastern Bengal and Assam, Rungpur being about its western limit. During the past 2 years it has been experimentally grown at Pusa, and it is being grown also in other parts of India, from seed obtained from Pusa.

"Eri silk has pecularities which distinguish it from all other silks cultivated or collected in India. In the first place, the worms require only castor leaves for food; mulberry is not a food plant. In the second, the cocoon is not a closed one and is not reelable in the same way as are mulberry or tussur silk cocoons; the caterpillar, in preparing the cocoon, leaves one end closed only with converging loops of silk, so that, while nothing can get in, the moth can push out; but the cocoon is made in layers, is not composed of a single thread and can not be reeled by the ordinary process. On the other hand, the silk has this immense advantage, that the cocoons do not require to be 'stifled,' that is, killed, to prevent the egress of the moth; in preparing mulberry and tussur silk, the cocoon is killed, since the moth in getting out so damages the cocoon that it can not be reeled so well. Seven or eight broods are obtained yearly, and as the production of eggs is large, a large brood can be secured from a small quantity of initial seed when castor is plentiful, and several crops of cocoons are obtainable yearly. The silk cocoons can be utilized just as cotton is, but yield a cloth far more durable and lasting. Dyed cloth is produced with ease by dyeing the cocoons, the thread, or the cloth."

A detailed account of the industry is contributed.

Sericulture [in Japan], C. SHIMOOKA (In *Agriculture in Japan. Tokyo: Govt., 1908, pp. 308–324*).—The author reviews the history of sericulture in Japan, showing that the origin of the industry belongs to antiquity. In 1906 there were 1,407,766 families engaged in silkworm raising. Silk production now forms one of the most important industries of Japan, coming close after rice and barley in importance as an article of domestic production, while as an article of export it stands first in importance.

FOODS—HUMAN NUTRITION.

Chemistry of flesh. A preliminary study of the effect of cold storage upon beef and poultry, A. D. EMMETT and H. S. GRINDLEY (*Jour. Indus. and Engin. Chem., 1 (1909), Nos. 7, pp. 413–436; 8, pp. 580–597*).—This includes two series of studies.

In the first series (pp. 413–436), the results are reported of 3 extended experiments, 2 with beef and 1 with fowl. In the case of the beef, uncooked meat held in storage for different periods was used, dfferent cuts being analyzed. In the ease of the fowl, fresh, unstored chickens, drawn frozen chickens, and undrawn frozen chickens were analyzed, the samples in each instance being cooked.

In the case of the refrigerated beef which was stored for 22 days, the average data indicate, according to the authors, that there was no loss of water.

"The percentage of the water-soluble solids, the soluble, insoluble and total protein, the noncoagulable protein, the nitrogenous and total organic extractives, the forms of ash, the total nitrogen and the total phosphorus, all remained practically unchanged.

"The only consistent real changes were a distinct increase in the total soluble and the soluble inorganic phosphorus, being 8 and 17.9 per cent respectively, and a decrease of 8.3 per cent in the nonnitrogenous organic extractives.

"The nutritive value of the meat was unaltered."

As regards the beef which was refrigerated for 43 days, there was a loss of water amounting to 1.3 per cent, causing a proportional increase in all the other constituents. This loss of water "produced differences in some instances which was sufficient to overbalance the amounts in the fresh samples."

The ratio of the nonproteid to proteid nitrogen was lessened.

"When allowance was made for the loss of moisture, the additional changes which occurred in cold storage consisted in a definite increase in the soluble dry substance, the nitrogenous, nonnitrogenous, and total organic extractives, the total soluble nitrogen, the soluble inorganic phosphorus, and a slight increase in the soluble coagulable and total soluble protein nitrogen, and also in the insoluble and total nitrogen.

"The chemical changes in the 43-day refrigerated meats were greater in number than in the 22-day samples, yet as far as nutritive value was concerned, the former showed an increase in the organic extractives and soluble protein, and but an insignificant decrease in the total protein.

"The analyses of the frozen drawn and undrawn chicken showed, when allowances were made for the variations in fat and moisture, that there was almost no difference between the two, one being equally as good as the other.

"The analysis of the fresh and the frozen drawn and undrawn fowl, obtained from the same lot, showed that the latter changed but slightly and to such an extent that there was practically no difference in the nutritive value of the three, after correcting for the differences in the fat and moisture content."

The second series (pp. 580–597) included extended studies of the comparative losses, and the chemical changes resulting therefrom, in the cooking of refrigerated meat held in cold storage for varying lengths of time.

In general, the authors concluded that "many of the differences between cooked meats from the samples which were held in cold storage for 6 and 43 days corresponded to those which were found to exist for the uncooked refrigerated samples.

"The cooked meats from the 43-day storage sample lost less in cooking either by boiling or roasting than did those from the 6-day sample, the broths and the drippings in these cases being on the average lower in their percentage content of soluble, insoluble, and total dry substance, of organic extractives, of soluble protein, of soluble ash, and of fat.

"The cooked meats from the longer stored sample were higher in their percentage content of moisture and were therefore juicier, higher in soluble and insoluble dry substance, in nitrogenous, nonnitrogenous and total organic extractives, in fat, in total ash, and in soluble inorganic, total soluble, and total phosphorus. Further, the percentages of total nitrogen, insoluble and total

protein were practically the same as were those for the samples from the 6-day storage meat. Therefore the cooked meats from the 43-day samples, judging from the chemical composition, were at least as nutritious as were those from the samples stored for the shorter period of time."

Report on the nature of "black spots" on chilled beef, E. KLEIN (*Meat Trades' Jour., 30 (1909), Nos. 1113, p. 234; 1114, pp. 260, 261, figs. 2*).—According to the author's observations, the so-called "black spots" are due to a fungus, *Oïdium carnis*. The development of this fungus is described.

In the light of experiments with animals, according to the author, the material of the black spots "is harmless to the animal body. . . . The presence of the mycelium does not in any way alter the normal character of the tissue elements themselves, either those amongst which the mycelium is situated or those beyond its extension."

The average amount of salt in Vienna pickled meat, A. LAMBERT (*Tierärztl. Zentbl., 32 (1909), No. 26, pp. 404–411*).—The average salt content of 95 samples was 6.4 per cent. Disregarding extreme values, the average was 5.3 per cent. Even this quantity is considered excessive as 5 per cent, in the author's opinion, sufficed for satisfactory pickling for the local market.

Isolation of the pressor principles of putrid meat, G. BARGER and G. S. WALPOLE (*Jour. Physiol., 38 (1909), No. 4, pp. 343–352, figs. 2*).—According to the authors' summary, bases are formed in the putrefaction of horse meat which cause a rise of arterial blood pressure, when injected intraveneously, and which are derived from amino acids by loss of carbon dioxid.

"The following have been insolated: Isoamylamin (from leucin), *p*-hydroxyphenylethylamin (from tyrosin), and probably phenylethylamin (from phenylalanin). Of these the second is the most active."

The extractives of fish flesh, U. SUZUKI and K. YOSHIMURA (*Jour. Col. Agr. Imp. Univ. Tokyo, 1 (1909), No. 1, pp. 21–58; Ztschr. Physiol. Chem., 62 (1909), No. 1, pp. 1–35*).—This study included the flesh of lobster, eel, and several sorts of fish, fresh and dried. Determinations were made of creatin, creatinin, xanthin, etc., and the presence of various monamino acids was demonstrated. The investigation was conducted along the same lines as is customary in the study of meat extract, the methods followed being described.

The extracts varied with reference to the kind and amount of the bodies isolated. The occurrence of hexon bases in quantity in fish and lobster flesh is especially noteworthy.

M. Yamakawa and Y. Irie were associated with the authors in the investigation.

Artificial egg yolk, F. BORDAS and F. TOUPLAIN (*Ann. Falsif., 2 (1909), No. 10, pp. 370–372*).—The samples analyzed consisted of casein colored with coal-tar dye.

Desiccated foods, F. TOGGENBURG (*Schweiz. Wchnschr. Chem. u. Pharm., 47 (1909), No. 31, pp. 477–480*).—The process of manufacture of highly desiccated commercial food materials from cereals is described, and analyses are quoted of an oat product of this character and data given regarding the amount of water which such foods will absorb in comparison with ordinary products. A high degree of heat is used in the manufacture of these goods and a decided increase in the soluble carbohydrates was noted.

The bleaching of flour, W. D. HALLIBURTON (*Jour. Hyg. [Cambridge], 9 (1909), No. 2, pp. 170–180*).—Investigations are reported in connection with a general discussion of flour bleaching.

According to the author's results with samples of starch and protein (fibrin) to which small quantities of sodium nitrite were added, the nitrite hindered

and lessened the action of amylolytic and proteolytic enzyms, the retarding action being very great in the presence of quite minute amounts of nitrites.

"Seeing that nitrous acid and its salts produce no known chemical action on starch, their inhibiting action on its digestion by amylolytic enzyms can only at present be explained by their action on the enzym.

"But in the case of protein there are two possibilities, action on the enzym and action on the substrate (protein)."

From further studies of this question the author concludes that "the presence of nitrous acid (even in the comparatively innocuous form of a salt) hinders enzym action.

"Previous treatment with nitrous acid alters a protein in such a way as to render it less readily susceptible to the solvent action of digestive juices."

Similar results to those with starch were obtained in salivary digestion of samples of bleached flour.

In studies with separated gluten the comparative indigestibility of that from bleached specimens of flour was marked. The decrease in digestibility was not proportional to the amount of nitrite-reacting material present in the flour. "From this one would judge that the main deleterious action is exerted by the nitrous fumes while in contact with the flour, and the diminution of digestibility does not depend on the more or less accidental quantity left behind. . . .

"The results obtained by those who have had the opportunity of examining the breads show that the lessening of digestibility of the bread is less marked than it is in the flour. This appears to be partly due to the reduction of the amount of nitrite-reacting material which occurs during baking, and in reference to the protein (gluten) one can only suggest that the process of baking increases the difficulty of digestion of that substance even in unbleached specimens, so that any difference in digestibility between a loaf made from it and one made from bleached flour would not be so noticeable. It can hardly be doubted that this, which after all is the most important question from the standpoint of the consumer, has had considerable influence with judges in deciding as they have that the objection to artificial bleaching is more or less theoretical. But knowing as we do the possible practical dangers which might ensue were millers allowed a free hand in the use of the very strong reagent they employ, it is necessary that a strict watch should be exercised to keep its use within the limits of safety."

Flour bleaching, its relation to bread production and nutrition, J. A. Wesener and G. L. Teller (*Jour. Indus. and Engin. Chem., 1 (1909), No. 10, pp. 700–711*).—To secure data regarding the effects of bleaching on flour an experiment of 11 weeks' duration was undertaken, in which bread and biscuits made from bleached and unbleached flour were fed to rats. The composition of the flour before and after bleaching was determined and data regarding the yield of bread, the size and quality of the loaf, and other similar information were recorded for the 2 sorts of flour.

The authors state that even in the short process of bread making followed the nitrites of the bleached flour were in many instances entirely removed.

At the end of the period a number of rats from each lot were dissected. A second test with rats, covering a period of several months, was also made but the data are not reported, the general findings, according to the authors, being substantially the same as in the experiment referred to above. "There were noticed no nutritional disturbances of any kind, and the post-mortem examination showed no lesions which in any way could be attributed to the bread made from . . . [bleached] flour. In addition to the feeding experiments conducted with the rats, we have fed the guinea pigs, which we have always on hand for experimental purposes, bread from bleached flour covering a period of more

than 6 years. During this time we have never once noticed any symptom or sign in the health of the animals which could in any way be traced to the bread made from bleached flour. Post-mortem examinations never revealed any lesion which could in any way be associated with the food which they had been receiving."

From their experiments and a general summary of data, some deductions are drawn from which the following are quoted:

"The essential action of the bleaching of flour is to remove from it a small amount of yellow color which in itself is in no wise a valuable constituent in the flour from a food standpoint, and the presence of which is objectionable because it detracts from the flour in the eyes of the consumer by whom the demand for flour is created. The best results are obtained by its use only when thorough purification and cleaning are adopted; and it in no way contributes to the covering up of an unsound or damaged condition in the wheat. . . . The most searching investigations have failed to show the presence in the commercially bleached flour of any substance that in the minute quantities in which it is present is in any way injurious to the bread-making qualities of the flour, or is in any way poisonous or has any toxicological or preservative action, or any action which is prejudicial to digestion or nutrition."

The cooking of bread, H. MARCHAND (*Meun. Franç., 25 (1909), No. 288, pp. 208–210*).—Larger numbers of micro-organisms were found, after baking, in loaves weighing 2 kg. than in those weighing 1 kg. On an average a larger amount of starch was converted into soluble form in the smaller than in the larger loaf.

Notes on the prognosis and treatment of pellagra, C. H. LAVINDER (*Pub. Health and Mar. Hosp. Serv. U. S., Pub. Health Rpts., 24 (1909), No. 37, pp. 1315–1321*).—According to the author, "so far as a dietary containing corn is concerned, there is abundant evidence that good corn is not only a wholesome but a harmless food, and not a few writers have pointed out the folly of those who counsel the total rejection of so valuable a cereal. At the same time, entirely wholesome corn is not always easily differentiated from harmful corn. In the light of our present knowledge, therefore, maize should be admitted, it seems to me, into the dietary of certain institutions, like insane asylums, with the utmost caution. As for the use of corn or its products elsewhere or in one's individual diet, that is a matter which is as yet, to some extent, sub judice, and must for the time perhaps be left to individual judgment."

Chemical studies of rice and rice products, ALICE R. THOMPSON (*Hawaii Sta. Rpt. 1908, pp. 51–58*).—Analyses are reported of imported Japanese rice, station-grown Japanese rice, and Hawaiian "Gold Seed" rice, both polished and unpolished seed, and also of rice paddy and straw from imported and Hawaiian rice and from rice grown under different conditions. In every case the different nitrogenous constituents were determined. In the rice grain proximate analyses, and in the rice straw and paddy, proximate and ash analyses, are reported.

Little variation was noted in the chemical composition of the different varieties of rice, and the author is of the opinion that the claim for superiority of Japanese imported over Hawaiian grown rice is not substantiated so far as nutritive value is concerned. The work along this line will be continued.

Comparison of the analyses of polished and unpolished grain showed that the unpolished rice contained about four times as much fat as the polished, as well as more protein, crude fiber, and ash. Practically all the nitrogen of the rice grain was found to be proteid nitrogen.

As regards rice feeding stuffs, the data reported show, according to the author, that "Japan Seed rice paddy has the lowest protein value. The Japan Seed

rice and the dry-land grown rice contain a little more fat than the Gold Seed, and about 4 per cent more fiber. Studying the ash constituents, the Japanese rice and the dry-land grown rice contain the highest percentage of potash, the Japan the least phosphoric acid, the Hawaiian rice the most lime. The magnesia is about the same all through.

"In one case the dry-land rice variety was grown under wet-land conditions. Under these conditions the protein and fiber became less, the lime a little higher, but no other especial change was produced.

"The composition of the rice straw is not so definite as that of the paddy. Rice of the same variety varies.

"As for its ash constituents, the dry-land variety of straw takes up less lime but much more phosphoric acid than the other rices.

"In case the dry-land variety is grown under wet-land conditions, the crude fiber and lime increase and the protein and phosphoric acid decrease. There is not much difference between the Japan wet-land rice and the Hawaiian wet-land rice.

"The composition of rice hay is calculated from the analyses of both paddy and straw, knowing the proportion of paddy to straw. Only the dry-land rice hay is at present of practical importance, as it can be most cheaply grown. As it has the highest protein content, it will be of more value as a fodder."

Rice, C. Shimooka (In *Agriculture in Japan. Tokyo: Govt., 1908, pp. 170–210*).—A summary of statistical and other data regarding the production and use of rice and concerning the rice industry in Japan and Formosa.

According to the author's summary, the average annual consumption of rice per person in Japan for 1902–1906 was 5.05 bu.

The extractives of rice, U. Suzuki, K. Yoshimura, and S. Fuji (*Jour. Col. Agr. Imp. Univ. Tokyo, 1 (1909), No. 1, pp. 77–88*).—The authors studied the kind and quantity of the cleavage products of the proteid of polished rice and of rice bran. From the full data reported regarding the cleavage products it may be noted that the rice proteid contained on a dry-matter basis 14.3 per cent leucin, 14.5 per cent glutaminic acid, and 1.6 per cent arginin, as compared with 8.6 per cent leucin, 4.7 per cent glutaminic acid, and 3.4 per cent arginin in the bran.

The chemical composition of tamari-shoyu, K. Yoshimura (*Jour. Col. Agr. Imp. Univ. Tokyo, 1 (1909), No. 1, pp. 89–96*).—The author believes that the putrescin and ornitin isolated from tamari-shoyu, a special kind of soy sauce, are formed from arginin.

The examination of English marmalades, F. Härtel and W. Mueller (*Ztschr. Untersuch. Nahr. u. Genussmtl., 17 (1909), No. 11, pp. 667–669*).—The results of comparatively complete analyses of 24 English marmalades are shown. Salicylic acid and agar were present in only one instance.

The acidity of cherry, raspberry, currant, strawberry, and black currant juices, F. Muttelet (*Ann. Falsif., 2 (1909), No. 10, pp. 383–386*).—Malic acid was found in cherry juices and citric acid in the other fruit juices. Tartaric acid was not present, at least in quantities sufficient for determination. The author concludes therefore that the presence of tartaric acid in preserves, jellies, or sirups made from the fruits enumerated indicates sophistication, and that when tartaric acid is the only acid present the goods do not contain the juices of these fruits.

Composition of Scuppernong, Concord, and Catawba grape juices, with some notes on the determination of total acid, H. C. Gore (*Jour. Indus. and Engin. Chem., 1 (1909), No. 7, pp. 436–441*).—Quotations from the author's summary follow:

"The Scuppernong grape juices were considerably less rich than the other varieties in all constituents except total acid, and two out of the three varieties analyzed contained sucrose.

"The maceration of the cold-pressed Concord juice for 16 hours had little effect on its composition.

"The hot-pressed Concord juices were considerably richer in solids than the cold-pressed, and this difference was due to slight increase in ash, total acids, and total tartrates, an increase in nitrogen and decided increases in undetermined solids, and tannin and coloring matter.

"The Catawba grape juice was similar in composition to the cold-pressed Concord, but higher in total acids, total tartrates, and protein. . . .

"When grape juice low in tannin and coloring matter was titrated, litmus indicated from 96 to 98 per cent of the acids present.

"When juices high in tannin and coloring matter were titrated, but from 85 to 90 per cent of the acids apparently present were indicated by litmus. After removing the tannin and coloring matter litmus indicated from 96 to 97 per cent of the amounts of acid shown by phenolphthalein.

"Litmus is to be preferred to phenolphthalein in the titration of total acid in products containing appreciable quantities of tannin and coloring matter since by its use these substances are not appreciably titrated."

Grapes and their products as food for man and animals, C. GRIMALDI (*Bol. Quind. Soc. Agr. Ital., 14 (1909), No. 8, pp. 369–388*).—An extended summary and discussion of the manufacture and use of grapes, wine, and other grape products, and similar topics.

The examination of Gironde white wines, BLAREZ, CARLES and GAYON (*Ann. Falsif., 2 (1909), No. 10, pp. 375–378*).—Analyses are reported and briefly discussed.

Ségonnaux wines, A. DESCOMPS (*Ann. Falsif., 2 (1909), No. 11, pp. 408, 409*).—A number of analyses are reported.

Fruit beers (*Pharm. Zentralhalle, 50 (1909), No. 33, pp. 684*).—Fruit beers, called "bees," are described and analyses of a home-brewed and a commercial product reported.

The contents of sulphurous acid in beer, A. BONN (*Ann. Falsif., 2 (1909), No. 3, pp. 44, 45*).—The results show the amount of sulphurous acid in beer to which no addition of sulphites had been made.

The chemistry of hops, R. SILLER (*Ztschr. Untersuch. Nahr. u. Genussmtl., 18 (1909), No. 4, pp. 241–271, figs. 4*).—This is a contribution to the chemistry of hops and consists chiefly of a study of the bitter substances. The investigation includes a study of the nature of the bitter acids and the resins.

Minutes of evidence taken by the royal commission on whisky and other potable spirits with appendices (*London: Govt., 1909, vol. 2, pp. 275, map 1*).—This volume contains a list of witnesses appearing before the royal commission and the minutes of evidence, while a number of papers are included in the appendices, among others, contributions on analyses of various samples of rum, by J. Heron; on analyses of Jamaica rums from the docks, by F. L. Teed; analyses of eaux-de-vie, cognacs, etc., by Fernbach; analyses of genuine cognac brandies, by P. Schidrowitz; analyses of whiskies, brandies, rums, gins, and other goods, and a study of pot still and patent still spirits and analytical analyses undertaken to show the changes in spirits during storage in wooden casks and in glass bottles, together with data on the examination of commercial spirits and methods of estimating the secondary constituents, by T. E. Thorpe; information regarding the law and practice of the board of customs, by A. J. Tedder; and other similar topics and summaries of data on pure food legislation.

The caffein content of coffee and the loss of caffein by roasting, K. LENDRICH and E. NOTTBOHM (*Ztschr. Untersuch. Nahr. u. Genussmtl., 18 (1909), No. 5, pp. 299–308*).—Coffees from various sources were analyzed as to their caffein content before and after roasting in 300 gm. lots in the laboratory. The caffein originally contained in the coffee on the average was 1.46 per cent, calculated to dry substance. The caffein loss by roasting was on the average 5 per cent of the total caffein.

The fat and water content of cocoa powders, A. REINSCH (*Ber. Chem. Untersuch. Amt. Altona, 1908, pp. 29–31; abs. in Ztschr. Untersuch. Nahr. u. Genussmtl., 18 (1909), No. 4, p. 281*).—Twenty-five samples of cocoa were examined, 11 showing a fat content of from 13.1 to 20 per cent, 12 from 20.1 to 25 per cent, and 2 from 25.1 to 30 per cent. Among 21 samples of cocoa powders 6 had a water content below 5 per cent, 9 had from 5.1 to 6 per cent, 5 from 6.1 to 7 per cent, and 1, 7.34 per cent.

The adulteration of mustard, G. JORGENSEN (*Ann. Falsif., 2 (1909), No. 10, pp. 372–375*).—Determinations are reported of mustard essence and thiosinnamin in different species of Brassica seed, the data being discussed with reference to pure food law requirements.

The adulteration of saffron, E. COLLIN (*Ann. Falsif., 2 (1909), No. 10, pp. 378–383, figs. 2*).—An illustrated, histological study of vegetable substances with a view to the detection of the adulteration of saffron.

The chemical composition and analysis of licorice bonbons and similar products, A. AUGUET (*Ann. Falsif., 2 (1909), No. 10, pp. 387–390*).—The examination of such goods is discussed and analytical data reported.

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 91, pp. 2; 92–93, pp. 4; 94–99, pp. 8; 100–101, pp. 4*).—The subjects included are the misbranding of lemon, raspberry, and strawberry extracts, canned peaches, plums, pears, and apricots, beans, water, canned corn, canned tomatoes, sirup, and a cereal, the adulteration of oats, and the adulteration and misbranding of sirup.

Official inspections (*Maine Sta. Off. Insp. 13, pp. 93–100*).—Data are given regarding the examination under the state law of a number of samples of coffee, gelatin, sweet oil, and honey.

Food and drug inspection (*Nevada Sta. Bul. 70, pp. 5–32*).—This bulletin contains the text of the pure food and drug law enacted by the Nevada state legislature of 1909 and the standards of purity adopted. The supervision and enforcement of this law are placed in the hands of the director and staff of the Nevada Station.

[Pure food work in Florida] (*Fla. Quart. Bul. Agr. Dept., 19 (1909), No. 3, pp. 59–69, 94–107*).—The text of the Florida pure food law is quoted and data reported regarding the examination of a large number of samples of alcoholic beverages, drugs, butter, coffee, condensed milk, flavoring extracts, catsup, baking powder, and miscellaneous materials.

Report of the state food commissioner, A. H. JONES (*Ann. Rpt. State Food Comr. Ill., 9 (1908), pp. VII+316, pls. 2*).—In addition to the report of the commissioner summarizing the work of the department, this volume contains the report of the state analyst, T. J. Bryan, the report of the stock food chemist, Lucy F. Doggett, reports of the food and stock inspectors, the text of the state pure food law, tentative food standards, summaries of bulletins issued by the state food commission's office, and similar data.

Out of a total of 5,420 foods of different sorts and stock foods, 3,642 were found to be legal and 1,778 illegal.

The report of the commissioner and the reports of the chemist contain a considerable amount of data regarding the manufacture and use of different food products.

Foodstuffs [and drugs], D. HOOPER (*Ann. Rpt. Indian Mus. Indus. Sect., 1908–9, pp. 13–16*).—Data are given regarding the analyses of Burmese seaweed (*Catanella impudica*), cassava starch, plantain meal, the fruits of a wild date (*Phœnix paludosa*), and a number of samples of rice and drugs. The wild date fruits were tested for sugar, but the quantity found was so small that in the author's opinion it could not be profitably separated for industrial purposes.

Products for foodstuffs and special use, C. SHIMOOKA (*In Agriculture in Japan. Tokyo: Govt., 1908, pp. 157–161*).—Data are given regarding the average acreage over a period of years and the average yearly production in Japan of rice of different sorts and of other cereals, of soy beans, sweet potatoes, potatoes, and some other agricultural crops.

Scattered through this and other sections of the volume may be found much information regarding the kind and amount of vegetable and animal food products used in Japan, the present food habits as compared with those of earlier times, and similar topics.

The balance between inorganic acids and bases in animal nutrition, E. B. FORBES (*Ohio Sta. Bul. 207, pp. 23–52*).—This bulletin seeks to show the bearing upon practical animal nutrition of the relationship between those mineral elements of our foodstuffs and of living animal tissues, which in the body give rise to inorganic acids, and the various means at the disposal of the animal for accomplishing protection from these acids through effecting their neutralization. The relation of ash constituents to human nutrition in general is also considered. The results of investigations on this subject are reviewed in detail and some of the conclusions of the author are as follows:

"[Mineral] acids are formed chiefly by the cleavage and oxidation of the proteids, either of the body or of the food, the sulphur and phosphorus contained therein, as constituent parts, being oxidized to the corresponding inorganic acids. . . .

"The continued neutralization of excessive amounts of acids by some of these means, especially by use of the carbonates of the bones, may mold the whole style of development of a growing animal; may cause serious states of malnutrition and may act as contributory causes of a number of diseases of both man and other animals. . . .

"The practical bearing of the subject is on the feeding of such animals as are reared most largely on cereals, namely, swine and poultry; especially on the growth of the bones of animals; on acidosis in infants; and on the care of sufferers from rickets, osteomalacia, osteoporosis, bran disease, and diabetes. . . .

"It is important not only that there be a considerable excess of mineral bases in the food but also that this excess be maintained at a high level, that is, that aside from the balance between acid and base, the total quantity of ash should be considerable. . . .

"The capacity of the animal body to neutralize and eliminate alkali seems to be entirely adequate. In practice, animals do not experience injurious excess of alkali as they do excess of acid.

"Consumption of a needless amount of protein unnecessarily taxes the acid-neutralizing capacity of the anmial, and if carried to a sufficient extreme, results either in discouragement of the formation of bone or in malnutrition of the bones. . . .

"A high fat-content, or indigestible character of the fat of milk fed to infants suffering from digestive disturbances, causes acid intoxication by withdrawal of alkalis, by way of the feces, in the condition of difficultly soluble calcium soaps. . . .

"Any such circumstances, as drought, or poverty of the soil in calcium and phosphorus, as tend to diminish the content of the forage in these elements, at the same time limits the growth of the bones and favors the development of diseased conditions in the animals consuming them.

"No animals which consume fruits, vegetables, milk, or roughage in sufficient proportion to other food are likely to suffer from an excess of mineral acids in the body. Animals fed too little else than meat, eggs, and cereal foods, including bread, are more likely than others to suffer from an excess of inorganic acids or a deficiency of inorganic bases.

"Growing animals, when fed for protracted periods on either cereals or meats alone, suffer from malnutrition of the bones, this ailment being caused by the deficiency of these foods in mineral bases.

"Swine, because of their very rapid growth, have especial need for calcium in the food, as is indicated by the unusual richness of sow's milk in calcium. Corn contains less calcium than other common grain foods and on that account is less perfectly adapted to serve as an only food for swine.

"Clover and alfalfa are especially rich in calcium and hence serve to make good the deficiency of corn in this element."

A bibliography is appended.

ANIMAL PRODUCTION.

[Analyses of Hawaiian fodders], ALICE R. THOMPSON (*Hawaii Sta. Rpt. 1908, pp. 58, 59*).—Analyses are reported of Rhodes grass, cassava waste, American wheat hay, and cowpea, pigeon pea, and jack bean green fodder, as follows:

Composition of Hawaiian fodders.

Kind of fodder.	Water.	Protein.	Amid nitrogen.	Fat.	Nitrogen-free extract.	Crude fiber.	Ash.	Potash.	Lime.	Phosphoric acid.
AIR-DRIED.										
	Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
Rhodes grass hay	11.75	6.08	0.212	2.31	42.51	30.20	7.15	1.314	0.730	0.280
Do	9.87	7.25	.204	1.39	44.64	29.21	7.64	....	.805	....
Wheat hay	9.44	4.48	.106	1.82	45.14	31.80	7.32	....	.375	....
FRESH MATERIAL.										
Cowpea (*Vigna catjang*)	83.15	3.71	.169	.22	5.26	5.75	1.91	.681	.290	.183
Pigeon pea (*Cajanus indicus*)	70.00	7.11	.139	1.65	7.88	10.72	2.64	.904	.428	.259
Jack bean (*Canavalia ensiformis*)	76.81	5.21	.204	.48	8.44	6.36	2.70	.650	.780	.162

"The fat content of the cowpea is lower than that of American cowpeas, but the jack bean and pigeon pea contain a good deal of fat (as estimated by ether extraction). The cowpea has a higher fiber content than the average pea grown in America."

[Analyses of feeding stuffs], R. E. ROSE and E. P. GREENE (*Fla. Quart. Bul. Agr. Dept., 19 (1909), No. 3, pp. 84–93*).—Analyses are reported of rescue grass hay, marsh grass hay, wheat bran and middlings, cotton-seed meal, barley, oats, and mixed feeding stuffs.

Commercial feeding stuffs, R. E. STALLINGS (*Bul. Ga. Dept. Agr., 1909, No. 48, pp. 81*).—This contains the text of the feeding stuffs law and comments thereon, also rules and regulations prescribed by the commissioner of agriculture which relate to the execution of the law. Analyses are reported of bran,

middlings, and other wheat products, cotton-seed meal, dried beet pulp, corn chop, oats, hominy, and poultry and mixed feeds. Formulas are given for condimental stock feeds and examples of rations for all kinds of live stock.

Inspection of feeding stuffs, E. L. Baker et al. (*New York State Sta. Bul. 316, pp. 163–251*).—This bulletin contains a list of brands of feeding stuffs licensed for 1909 and reports analyses of 403 samples of feeds which include cotton and linseed meals, malt sprouts, distillers' and brewers' grains, corn brans, gluten, hominy, and compounded feeds, and animal products.

"With a large number of the compounded feeds analyzed during the past season the proportion of protein and fiber and the general appearance of the mixtures, or other reasons, led to a more detailed examination than the mere determination of protein and fat. Not only have the percentages of protein, fat, and fiber been determined, but these mixtures have been studied with reference to the ingredients from which they were compounded. These examinations not only reveal the presence of oat hulls, peanut hulls, rice hulls, ground corncob and weed seeds in the feeding stuffs found in New York markets, but also show that many of these mixtures are misbranded in a way calculated to deceive the purchaser, a deception which must be regarded as intentional."

Wheat offals were often found adulterated with ground corncob. "The entrance of oat hulls into the feeding stuffs trade has made it possible to adulterate grain mixtures in a way that escapes ordinary observation. Often the term 'chop' or 'corn and oat' is a part of the brand name and carries with it the significance that has been attached to it in the past and thus adds to the deception."

Molasses feeds were often found to contain weed seeds, oat hulls, oat glumes, and straw. "The writer is informed on good authority that the mill and elevator sweepings made in Buffalo are shipped to the manufacturers at a uniform price of $9 per ton at the place of mixing. After mixing these are sold to the consumer at prices approaching $27 or $28 per ton."

A table is given showing the composition and digestibility of buckwheat hulls, corncobs, oat feed, peanut feed, husks, and shells, and rice hulls, which are used in adulterating feeding stuffs. The text of the feeding stuffs law as recently amended is also included.

By-product feeding stuffs, H. P. Armsby (*Amer. Hay, Flour, and Feed Jour., 15 (1909), No. 6, pp. 31, 32*).—This is a discussion of the feeding value of by-products. It is pointed out that under the present process bran is a much more expensive feeding stuff than standard middlings as a source of energy. Likewise, linseed meal is more expensive than distillers' grains. The cost per therm of these and other by-products is given.

American molasses feeds; their manufacture and composition, J. E. Halligan (*Amer. Hay, Flour, and Feed Jour., 15 (1909), No. 6, pp. 27–29; Jour. Indus. and Engin. Chem., 1 (1909), No. 7, pp. 441–445*).—This is an account of the methods of manufacturing molasses feeds. Analyses are given of foreign and domestic brands found on the market.

How should dried potatoes be fed? Parow (*Ztschr. Spiritusindus., 32 (1909), No. 39, pp. 449, 450; Deut. Landw. Presse, 36 (1909), No. 79, p. 842*).—Seventy-four different rations containing dried potatoes in the form of flakes or chips are suggested for various kinds of live stock.

The self-heating of hay, F. W. J. Boekhout and J. J. O. de Vries (*Centbl. Bakt.* [*etc.*], *2. Abt., 23 (1909), Nos. 1–5, pp. 106–108*).—From the results of these experiments, which are in continuation of earlier work (E. S. R., 17, p. 1001), it is evident that water has a great influence on the oxidizing process occurring during the heating of hay and that temperatures under 100° C. favor

oxidation with free oxygen and the formation of carbon dioxid. Pure oxygen does not have any greater influence upon the oxidizing process than does ordinary air. The heating of hay is due to oxidation at the beginning, and the rate of oxidation rises with the temperature.

Digestion coefficients with sheep, J. H. SHEPARD and A. E. KOCH (*South Dakota Sta. Bul. 114, pp. 525–554*).—This bulletin reports digestion experiments with 6 grade Merino wethers. The results are given in the following table:

Average coefficients of digestibility obtained with sheep.

Kind of feed.	Number of trials.	Protein.	Ether extract.	Nitrogen-free extract.	Crude fiber.
		Per ct.	*Per ct.*	*Per ct.*	*Per ct.*
Lowland prairie hay (native grasses)	2	42.5	39.9	56.5	60.1
Bromus inermis hay	10	48.3	35.6	64.4	59.0
Sixty-Day oats	1	85.5	79.3	85.7	49.7
Swedish Select oats (Brome grass roughage)	11	77.2	87.9	82.3	35.5
Emmer or speltz (various roughages)	9	79.6	88.2	88.2	50.5
Oat straw	4	13.7	31.1	51.7	71.6
Alfalfa hay	6	77.9	37.4	71.8	43.8
Hanna barley (various roughages)	13	76.6	75.5	91.4	56.3
Manchuria barley (Brome grass roughage)	2	83.9	80.0	90.9	54.3
Durum wheat (Brome grass roughage)	2	78.1	65.0	92.0	39.8
Black Voronezh millet (various roughages)	8	70.1	81.6	88.1	40.2
Red Orenburg millet (oat straw roughage)	4	54.8	88.0	88.2	24.3
Minnesota No. 13 corn (Brome grass roughage)	2	77.6	87.4	96.0	29.3
Upland prairie hay	6	32.0	31.7	50.7	52.7
Cord grass hay (*Spartina cynosuroides*)	6	39.1	50.1	49.0	56.1
Slough grass hay (native grasses)	6	41.6	54.0	54.6	58.8
Kentucky blue grass hay	6	56.6	53.2	62.2	67.0
Western wheat grass hay	6	51.5	39.4	60.9	68.2
Sorghum fodder	6	53.4	76.7	64.1	70.8
Corn ensilage	2	56.7	66.4	78.4	68.3
Corn stover	2	52.5	36.3	63.7	72.1

Protein metabolism with sheep on a ration of pure grasses, O. HAGEMANN (*Arch. Physiol. [Pflüger], 128 (1909), No. 4–5, pp. 238–250*).—Digestion experiments with growing wethers are reported with English rye grass (*Lolium perenne*), bird's foot trefoil (*Lotus corniculatus*), meadow fescue (*Festuca pratensis*), and meadow foxtail (*Alopecurus pratensis*). The most striking result obtained was with the meadow foxtail, as will be seen from the following table:

Coefficients of digestibility of different hays, obtained with sheep.

Kind of hay.	Number of days.	Dry matter.	Protein.	Ether extract.	Nitrogen-free extract.	Crude fiber.	Ash.
		Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
Lolium perenne	8	59.6	68.7	52.6	63.2	52.3	53.0
Lotus corniculatus	6	59.8	75.5	42.9	64.3	48.5	62.5
Normal meadow hay	8	55.8	63.7	64.5	61.7	49.6	36.7
Festuca pratensis	6	58.1	42.4	39.6	63.7	58.2	37.7
Alopecurus pratensis	6	66.1	73.7	38.8	71.0	71.0	34.3
Normal hay	7	55.5	62.6	52.6	61.8	49.9	35.5

On the digestibility of globulin (blood bread) by wethers, O. HAGEMANN (*Arch. Physiol. [Pflüger], 128 (1909), No. 10–12, pp. 587–599*).—Defibrinated blood from a slaughterhouse was mixed with different kinds of meal, baked, and then fed to 2 wethers, 600 gm. of hay and 200 gm. of the bread being fed daily to a sheep weighing about 38 kg. The digestion coefficients of the blood bread were computed as follows: Dry matter 83.4, nitrogen 66.1, ether extract 33.8, nitrogen-free extract 94, and ash 79.4 per cent. The coefficients for a

sheep weighing 49 kg. on a daily ration of 696 gm. of hay and 300 gm. of blood bread were dry matter 75.3, nitrogen 66.3, ether extract 61, and nitrogen-free extract 86.5 per cent.

The respiratory exchange in the lungs was estimated by measurements, a detailed report of which is to be published. The respiratory quotient obtained was 0.922. According to the computations of the author there was a daily gain of 13.6 gm. protein and 19.6 gm. fat.

Heredity, thought, and transcendental memory from the standpoint of the physicist, G. EICHHORN (*Vererbung, Gedächtnis und Transzendentale Erinnerungen vom Standpunkte des Physikers. Stuttgart, 1909, pp. X+116; rev. in Nature [London], 81 (1909), No. 2082, p. 361; Arch. Entwickl. Mech. Organ., 27 (1909), No. 2, pp. 310–312*).—An attempt to reconcile the explanation of the properties of organisms manifested as inheritance, thought, and memory with other properties of matter by means of the electron theory.

On the alleged influence of lecithin upon the determination of sex in rabbits, R. C. PUNNETT (*Proc. Cambridge Phil. Soc., 15 (1909), No. 2, pp. 92, 93*).—The author has repeated the experiments of Russo (E. S. R., 21, p. 269), with negative results. In a series of treated does the proportion of males to females was 24 : 23, and in a series of untreated does 54 : 49.

On the influence of different nutrients on the number of blood corpuscles in herbivorous animals with simple stomachs, J. JUST (*Zentbl. Physiol., 23 (1909), No. 12, pp. 379–391*).—No appreciable increase of either white or red corpuscles was observed in rabbits during the digestion of sugar, fat, peptone, egg albumen, legumin, or water. These results agree with those previously found in other investigations on ruminants.

On the influence of different feeds on the movement of the gizzard in hens, MANGOLD and FELLDIN (*Zentbl. Physiol., 23 (1909), No. 9, pp. 302, 303*).—This is an abstract of a paper read before the German Physiological Society at Greifswald. Contractions of the gizzard muscles were more frequent with hard than with soft feeds. The length of the peristole with a feed of potatoes ranged from 26 to 30 seconds, mixed feeds 22 to 25 seconds, wheat 18 to 22 seconds, and barley 15 to 18 seconds.

The influence of age on the body temperature of geese and ducks, LÖER (*Arch. Physiol. [Pflüger], 128 (1909), No. 10–12, pp. 555–559*).—From 3 to 7 months of age the average body temperature of geese was 40.85° C.; from 6 to 12 months, 40.65°; from 2 to 5 years, 40.7 to 40.8°; and at 20 years, 41°. In ducks the average body temperature was as follows: From 1 to 3 months, 41.54°; 3 to 5 months, 41.83°; 6 months, 42.11°; 7 to 9 months, 42.15°; 1 year, 41.45°; 2 years, 41.46°; and 3 years, 42.45°.

Loss of live weight in animals during transportation, HERTER (*Deut. Landw. Presse, 36 (1909), No. 78, pp. 829, 830*).—This contains data on the loss in weight sustained by animals when sent to market by wagon, railroad, or on foot.

The animal husbandry of the colony of Eritrea, E. MARCHI (*Agr. Colon. [Italy], 3 (1909), Nos. 2, pp. 71–111, figs. 33; 3, pp. 149–183, figs. 9; 4, pp. 229–268, figs. 10*).—This is a statistical and general account of the animal husbandry, which is the chief occupation of the inhabitants of this Italian colony. According to the census of 1905 the number of live stock in the colony was, camels 46,853, horses, asses and mules 29,789, cattle 250,891, and sheep and goats 736,132.

[Stock breeding in Japan], C. SHIMOOKA (*In Agriculture in Japan. Tokyo: Govt., 1908, pp. 324–338*).—Cattle were kept in Japan in prehistoric times and the slaughter of cattle for food and for sacrifice was common until the introduction of Buddhism. The use of milk and butter was known, but the chief object for

keeping cattle was for draft purposes. The first step in modern improvement of cattle was the importation of 15 head in 1869. At the present time there are several native breeds besides the introductions of Ayrshires, Dutch, Simmenthaler, Brown Swiss, Devon, Jersey, and Shorthorn cattle.

The horse appears to have been indigenous to Japan. The first authentic record of foreign importation was in 247 A. D., when the King of Korea made a present of several horses to the Japanese court. European horses were imported in the sixteenth century. The native breeds are described. Sheep raising was not undertaken until 1817, and for some reason has never been very successful. Goats have been introduced from China and Korea. The rearing of swine dates back to antiquity, but was discontinued later because of religious prejudices.

In recent years the Government has encouraged the breeding of all kinds of live stock. In 1906 the total number of cattle was 1,190,373, horses 1,465,466, sheep 3,501, and goats 74,750.

[Stock breeding in Formosa], C. Shimooka (In *Agriculture in Japan. Tokyo: Govt., 1908, pp. 352–354*).—Stock breeding in Formosa is not engaged in to any large extent. There are two varieties of horses, the Chinese and Japanese, water buffaloes, and two varieties of yellow cow. A few foreign breeds of cattle have been introduced. Swine are quite extensively raised and are of the Chinese type. The goats are small and used as offerings at festivals.

Substitutes for skim milk in raising calves, E. S. Savage and G. W. Tailby, Jr. (*New York Cornell Sta. Bul. 269, pp. 491–517, figs. 24*).—This bulletin reviews the work of other investigators on feeding substitutes for skim milk, and reports investigations at this station for the past 2 years.

The calves which were used in this experiment were at first given whole milk, which was gradually replaced by skim milk or other substitute, and also were fed daily a grain mixture of ground corn and oats, bran, and oil meal, of which they were given all they would eat up clean. Hay was kept before them at all times. Whole milk was estimated to be worth $1.65 per 100 lbs. and skim milk 15 cts. per 100 lbs.

The following table contains the gains made on the various substitutes:

Gains made by calves on skim milk and skim milk substitutes.

Kind of feed given in addition to whole milk, hay, and grain mixture.	Number of calves.	Number of days.	Age at beginning.	Average daily gain.	Average cost per pound gain.
			Days.	*Pounds.*	*Cents.*
Skim milk	5	120	52.6	1.76	4.8
Schumacher calf meal	6	120	19.6	1.25	8.1
Lactina Suisse	5	105	Birth.	.70	11.6
Skim milk	7	150	...do....	1.53	4.8
Skim milk powder	6	150	...do....	1.23	6.4
Schumacher calf meal	4	150	...do....	1.10	9.0
Blatchford calf meal	4	150	...do....	.87	13.4

"It is evident from the results of these experiments and those elsewhere that good, strong, healthy calves can be raised without skim milk or milk of any kind after the first 30 days.

"Skim milk, hay, and grain make the best substitute for whole milk in raising calves. A calf fed on skim milk should reach a weight of 300 lbs. at 5 months of age, and the gain should be made at the rate of 1.5 lbs. per day, at a cost of less than 5 cts. per pound.

"If skim milk is not at hand, the best substitute for it seems to be third-grade dried skim milk powder. The average gains made in this experiment were not so large as with the skim milk, but were good. A calf fed on this food should reach a weight of 250 to 260 lbs. at 5 months of age, making an average gain of 1.25 lbs. per day at a cost of less than 6.5 cts. per pound.

"A tablespoonful of soluble blood meal mixed with each feed served to keep the bowels of the calves in better condition, and since it is comparatively inexpensive a wider use of it might be profitable."

Indian cattle in Jamaica, B. S. GOSSET (*Bul. Dept. Agr. Jamaica, n. ser., 1 (1909), No. 2, pp. 102–113, pls. 4*).—The Mysore, Gugerat, Gir, and Hissar breeds of cattle imported from India are described. All 4 breeds appear to be well adapted to the island conditions. The Mysore is an excellent draft animal and is used in place of mules to transport bananas to shipping places. The Gir breed is a good dairy breed, but the Hissar appears to be the most useful of all the humped breeds of Indian cattle which so far have been imported, as it is a general purpose animal.

Second annual report of the American Bison Society, 1908–9 (*Ann. Rpt. Amer. Bison Soc., 2 (1908–9), pp. 85, pl. 1, figs. 21*).—This report includes an account of measures which have been taken to preserve the American bison, and contains descriptions of some of the herds of pure-bred bison and bison crosses with cattle.

Farm management with sheep, F. W. WILSON (*Arizona Sta. Bul. 60, pp. 442–451, figs. 3*).—This contains information for the practical man on the pasturing, feeding, and general management of sheep.

Hog raising in the South, S. A. KNAPP (*U. S. Dept. Agr., Office Sec. Circ. 30, pp. 8, fig. 1*).—This circular was written to show how hog raising in the South may be made one of the most profitable lines of animal husbandry, and summarizes data for the most part previously noted (E. S. R., 14, p. 486; 19, p. 1170; 20, p. 569).

"The best way to make hog raising profitable in the South is to graze the hogs upon pasture prepared especially for them, supplementing the green food by the addition of a small grain ration. Upon this plan hogs can be raised at an average cost of 1½ to 3 cts. a pound, depending mainly upon the management of the sows and pigs and upon an economic plan of fattening."

Details are given of a cropping plan for economical pork production. Because of the instability of the weather at killing time large losses would be prevented if every market town in the South had an abattoir, sheds for holding hogs, a refrigerating plant, and rooms for curing hams, shoulders, and bacon.

Raising hogs in Colorado, H. M. COTTRELL (*Colorado Sta. Bul. 146, pp. 3–32, figs. 7, dgm. 1*).—This is a popular summary of information on hog raising under Colorado conditions.

The feeds specially recommended are barley, field peas, alfalfa pasture, and milo maize. "Barley, under irrigation, costs less an acre to raise than corn in the Mississippi Valley States, and will produce more pork. From 500 to 1,000 lbs. of gain can be put on hogs during the season from an acre of alfalfa pasture. It costs, including the rent of the land, from $3 to $6 an acre to raise field peas, and feeders estimate that an acre of good peas, when pastured off, will put 400 lbs. of gain on hogs."

The plants recommended for hog pasture are alfalfa, dwarf Essex rape, rye, winter wheat, sorghum, and sweet clover. Methods of feeding and management and finishing for market are described.

"One hundred thousand hogs are needed each month in Denver territory to supply the demand for pork and pork products.

"The Colorado packer wants a well-finished, fat, blocky hog weighing alive from 220 to 250 lbs. During the winter months there is a good, but limited demand for the city whole carcass trade, for well-finished hogs weighing alive from 150 to 175 lbs. each.

"Most of the Colorado hogs marketed in the past three years have been unfinished and too light in weight. A well-finished hog will dress 80 per cent; the average at the Denver packing houses in 1908 was 73 per cent.

"The chief trouble has been that most Colorado farmers neglect their hogs through the summer, stunting them, and stunted hogs do not finish well."

There are illustrations and brief descriptions of a portable hog house, an alfalfa rack for feeding, and the piggery at the Colorado College.

Timely hints to horse breeders, C. W. Gay (*Penn. Dept. Agr. Bul. 181, pp. 23*).—This is a popular article and contains hints for the practical breeder.

Can the laying ability of a hen be determined by external characters? Mrs. Handrik (*Ztschr. Landw. Kammer Schlesien, 13 (1909), No. 39, pp. 1169–1173*).—The author furnishes some data to show that neither the width of the pelvis nor the length of the back is an index of egg production.

Egg-laying competitions at Hawkesbury Agricultural College and Experiment Farm, D. S. Thompson (*Agr. Gaz. N. S. Wales, 20 (1909), No. 6, pp. 517–533, figs. 18*).—This is a report of the seventh annual and the second 2-year egg-laying competitions.

The effect of these competitions has been to increase the average egg production from 130 eggs per hen in the first competition to 180 in the seventh. The size of the eggs has also been increased with a view to reach the commercial standard of 24 oz. per dozen. In the first test the hens in 22 per cent of the pens laid eggs which were undersized. The 2-year test was won by white Leghorns, which laid an average of 245 eggs the first year and 191 eggs the second year.

Danish egg collecting (*N. Y. Produce Rev. and Amer. Cream., 28 (1909), No. 25, pp. 1042, 1044, 1046, figs. 3*).—An account of the work of the Danish Farmers' Cooperative Egg Export Association, organized in 1895, and now comprising 500 circles or local associations aggregating some 43,000 members, who pay about 13.5 cts. each as an entry fee. The object of the association is to establish the best possible market in foreign countries for Danish eggs by guaranteeing that the eggs delivered with the registered trade mark stenciled on each egg are absolutely fresh and clean, and by protecting the general interests of the Danish poultry keepers by preserving eggs, fattening and selling the poultry of the members, and promoting a rational poultry management. The methods of packing the eggs for export are described. The work of the association has been very successful. The sales during 1907 amounted to 10,000,000 lbs. of eggs and poultry, valued at $1,080,000.

The poultry industry in Maryland, with suggestions for successful poultry management, C. L. Opperman (*Maryland Sta. Bul. 138, pp. 9–71, figs. 27*).—This is a statistical and general account of the poultry industry of Maryland, much of the information having been obtained by visits to successful poultry farms in the State.

The methods of housing are described in considerable detail. There are descriptions of colony and continuous houses, both with open and with closed front. Other topics treated are incubation, natural and artificial brooding, feeding, and marketing. There is a bibliography of poultry literature and an account of the common diseases of poultry by G. E. Gage.

[Poultry keeping in Japan], C. Shimooka (In *Agriculture in Japan. Tokyo: Govt., 1908, pp. 348–351*).—In very early times poultry was kept for the flesh and for cock fighting. In 1876 the Government attempted to encourage

the industry, which prospered for a time. Quite recently more interest has been taken. Many European and Asiatic breeds have been introduced, but not enough eggs are produced to supply the home demand. The number of fowls in 1906 was 16,248,410, the number of ducks 299,219, turkeys 8,188, and geese 6,941. The number of eggs produced in 1907 was 699,494,137.

Preserving eggs, A. E. VINSON (*Arizona Sta. Bul. 60, pp. 431–433*).—Methods of preserving eggs by means of limewater and water glass are described.

Snail gardens, D. GEYER (*Sci. Amer. Sup., 68 (1909), No. 1754, p. 99*).—An account of the edible snail industry of France, Wurttemberg, and Baden, which seems to be of growing importance. Many of the snail farmers are beginners and their methods of caring for the animals, described in detail, show little evidence of a knowledge of the real needs. Most of the snails are sent to the Paris market, which opens the first of November.

"The great French demand for snails has led to the invention of imitations. The snail farmers collect the empty shells that have accumulated during the summer, wash them and sell them for about 25 cts. per thousand. The shells are sent to Paris, where they are filled with a mixture of snail flesh, liver, butter, and herbs."

DAIRY FARMING—DAIRYING.

The substitution of roots for concentrated foods in rations for milk production, E. S. SAVAGE (*New York Cornell Sta. Bul. 268, pp. 443–487, figs. 9*).—The object of these feeding trials was to compare the value of the dry matter in mangels with that in silage and in grain, and they were conducted in a manner similar to that of a Danish feeding trial previously reported (E. S. R., 16, p. 909). There were four groups of 5 cows each. The feeding period lasted 6 weeks, but the data do not include the first week of each period. The mangels were estimated to be worth $4.50 per ton and the silage $2.25.

In the experiments of 1907–8 ration 1 consisted of hay, silage, Ajax flakes, corn meal, wheat bran, and cotton-seed meal. In ration 2, 2 lbs. of mangels were substituted for each pound of silage. In ration 3, mangels were substituted for one-half the grain ration. In 1908–9 the rations were similar, but the grain ration consisted of Ajax flakes, buckwheat middlings, corn meal, wheat bran, and oil meal.

For the 2 years the total dry matter required for the production of 1 lb. of milk fat on the hay, grain, and silage ration was 22.34 lbs., on the hay, grain, and mangels ration 20.93 lbs., and on the ration wherein one-half of the grain was substituted for silage and mangels 22.02 lbs. The average cost of 1 lb. of milk fat on these rations was 20.7 cts., 27.4 cts., and 20.7 cts., respectively.

No conclusions were drawn as to the effect of the different rations on the live weight of the cows. One lb. of dry matter in mangels was considered equal to 1 lb. of dry matter in grain, which agrees with the Danish experiment, and a little more than equal to 1 lb. of dry matter in silage, but the cost of ration 2 was considered too high to be economical.

Estimating the average price of commercial feeding stuffs at $30 per ton, "it would seem to be a safe assumption that farmers can raise mangels for $4 per ton and thus reduce their feed bill very materially, by the judicious use of mangels to replace one-half of the grain ordinarily fed in the ration."

The effect of raw potatoes, potato flakes, and potato chips on milk production, J. HANSEN ET AL. (*Fühling's Landw. Ztg., 58 (1909), No. 16, pp. 577–591*).—The object of these trials was to determine the best form in which to feed potatoes to milch cows. The basal ration consisted of 8 kg. of hay, 3 kg. of oat chaff, 3 kg. of brewers' grains molasses, and 5 kg. of peanut cake per 1,000

kg. live weight. The effect of feeding these different rations was quite uniform, as will be seen by the accompanying table.

Average daily yield of milk with a supplementary ration of potatoes.

Period.	Number of cows.	Supplementary feed.	Yield of milk.	Specific gravity.	Fat.	Solids-not-fat.
			Kg.		*Per cent.*	*Per cent.*
1	12	Potato flakes	17.03	1.0316	3.23	8.81
2	12	Raw potatoes	15.67	1.0321	3.19	8.87
3	12	Potato flakes	15.23	1.0320	3.15	8.87
4	10	Dried potato chips	15.12	1.0322	3.04	8.93
5	10	Potato chips soaked in water	14.79	1.0323	3.11	8.93
6	10	Potato flakes	14.46	1.0323	3.04	8.92

The Swiss Spotted-Cattle Breeders' Association (*Landw. Jahrb. Schweiz, 23 (1909), No. 6, pp. 355–392*).—This contains the yields of milk, percentages of fat in milk, and other data relating to this breed. The annual yield of milk ranged from 1,750.7 to 5,796.5 kg., the percentage of fat from 3.40 to 4.46, and that of solids-not-fat from 12.13 to 14.32.

Annual report of the association for the development of the dairy industry of Hoorn, 1908 (*Verslag Ver. Exploit. Proefzuivelboerderij Hoorn, 1908, pp. 59, pl. 1, fig. 1*).—This report includes investigations on short cheese, self-heating of hay, feeding experiments with linseed meal, and trials of a new churn by F. W. J. Boekhout and K. H. M. Van der Zande, previously reported from other sources.

The influence of the health of the dairy animal on the nutritive value of milk, Moussu (*Hyg. Viande et Lait, 3 (1909), No. 10, pp. 473–488*).—The author calls attention to the excretory properties of the mammary gland, which is an organ of excretion as well as secretion. Alcohol, ether, chloroform, and potassium iodid have been found in milk. If these are in the feed, or other poisons are formed in the body during the lactation period, they may be eliminated by the mammary gland. Milk from animals in a diseased or abnormal condition must have less nutritive value and in many cases should be discarded altogether.

The milk of sheep, J. Alvarado y Albo (*Milch Ztg., 38 (1909), No. 41, pp. 482, 483*).—The author discusses the value of sheep's milk, especially in hot countries, and suggests that it should be studied from the physiological standpoint as most of our knowledge of milk has been obtained from investigations of cow's milk.

The relative nutritive value of sterilized, pasteurized, raw, and dried milk, E. C. Aviragnet and M. Péhu (*Rev. Hyg. et Méd. Infant., 8 (1909), No. 3, pp. 250–261*).—The authors conclude that raw milk of good quality is an ideal nourishment, and that pasteurization induces little change in the physical and chemical character of milk, while considerable change is induced by sterilization. An opinion regarding dried milk is reserved.

[Copper in certified milk], A. Springer and A. Springer, Jr. (*Jour. Indus. and Engin. Chem., 1 (1909), No. 9, pp. 676–678*).—Certified milk supplied from a certain dairy was found to contain traces of copper. Upon investigation, the authors found that the origin of the copper was from a boiler compound, and had been transmitted to the milk by means of the live steam employed in sterilizing the milk cooler.

Competitive exhibitions of milk and cream, C. B. Lane and I. C. Weld (*U. S. Dept. Agr., Bur. Anim. Indus. Circ. 151, pp. 36*).—This circular contains an account of a competitive exhibition of milk and cream held at Pittsburg, Pa.,

under the auspices of the Chamber of Commerce of that city and in cooperation with the Dairy Division of this Department. Besides a description of the methods of awarding the prizes, a list of the prize winners, and a copy of the revised score card for farm dairies, the circular contains several addresses on dairy contests, the scoring of milk and cream, and other problems connected with dairying and dairy legislation.

Pure milk for cities, A. HALSTEAD (*Daily Cons. and Trade Rpts. [U. S.], 1909, No. 3626 p. 7*).—This is a report on recent efforts which have been made by the health department of the city of Birmingham, England, to combat the spread of tuberculosis by supplying dairy farmers within 10 miles of the city with free tuberculin and veterinary assistance for testing their cows.

The necessity for the control of the milk industry, A. HOUGARDY (*Ann. Méd. Vét., 58 (1909), No. 10, pp. 568–579*).—An account of the danger of using unsanitary milk. Regulations on the sale of milk in Belgium are given, together with suggestions for making them more stringent.

The Lady Talbot Milk Institute (*Jour. Dept. Agr. Victoria, 7 (1909), No. 9, pp. 545–568, figs. 14*).—This is the first annual report of the institute, which was established on the plan of the Gouttes de Lait in France, with the object of reducing the death rate of infants in the city of Melbourne and surrounding municipal districts due to insanitary milk in the summer months. There is also an account by J. M. B. Connor of the equipment and methods adopted at the model dairy farm which supplies the milk distributed by the institute.

During the 5 months the institute was distributing milk, 300 infants were supplied, of whom only 8 died, a remarkable showing when it is considered that a majority when first put on the milk were already suffering from troubles caused by impure milk.

Mountain dairying, L. FUNDER (*Norsk Landmandsblad, 28 (1909), No. 38, pp. 465–467*).—An article containing a brief account of present methods of mountain dairying in Norway, with suggestions for their improvement.

Danish dairying, 1908, B. BÖGGILD (*Tidsskr. Landökonomi, 1909, No. 4, pp. 193–208*).—The usual general account of the conditions of the Danish dairy industry during the year is given.

The production and use of milk, butter, and cheese among the natives of Africa, O. KOCH (*Umschau, 13 (1909), No. 42, pp. 869–872, figs. 4*).—Brief notes are presented on the primitive methods used in dairy husbandry by the native tribes of Africa.

The condensed milk industry, D. S. BURCH (*N. Y. Produce Rev. and Amer. Cream., 28 (1909), No. 25, pp. 1016, 1018, 1020, 1022, figs. 4*).—A short sketch of the development of the condensed milk industry in this country, which began in 1856.

In 1880 there were 13,000,000 lbs. of condensed milk manufactured; in 1890, 33,000,000; in 1900, 187,000,000; in 1905, 303,000,000; and it will probably reach 500,000,000 lbs. in 1909. The amount exported amounts to about 25,000,000 lbs. annually, and the amount imported to about 7,000,000 lbs. Figures are quoted to show that by paying better prices for milk, condenseries usually take business away from creameries and cheese factories.

Creamery cost, R. C. POTTS (*N. Y. Produce Rev. and Amer. Cream., 28 (1909), No. 25, p. 998*).—Estimates are given for the cost of creamery construction and equipment for cooperative creameries such as are in successful operation in Oklahoma. There is an itemized list of the equipment necessary for a daily capacity of 1,800 lbs. of butter. The entire cost of such a creamery is estimated to be for equipment $1,180.70, for freight on equipment $100, for cost of installing machinery $70, for building the boiler and refrigerator room $1,600, and for water supply and sewerage $200, making a total of $3,150.70.

[Analyses of butter], A. NESTRELJAEW (*Milchw. Zentbl., 5 (1909), No. 10, pp. 447–453*).—This is a report regarding butter constants as determined in the years 1907–8 at the dairy laboratory at Smeinogorsk, Siberia. The range, classes of frequency, and deviation of these constants through the different months of the year are presented in tabular form.

The data can be summarized as follows: Range of water content 7.09 to 16.05 per cent, with the mode (or class of greatest frequency which indicates the type) 11 to 12 per cent. The salt content was mostly under 2 per cent. The range of the acidity of the butter was 1 to 8.53 per cent, and the mode 3 to 4 per cent; acidity of the butter fat, range 0.61 to 7.66 per cent, and the mode 1 to 2 per cent; refractive index at 40° C., range 40.5 to 46.1, and the mode 43 to 44; Reichert-Meissl number, range 19.65 to 33.14, and the mode 27 to 28; Hehner value, range 84.93 to 90.91, and the mode 86 to 87; range of specific gravity at 100° C., from 0.8638 to 0.8698; Köttstorfer number, range 218.14 to 234.47, and the mode 224 to 225; and the iodin number, range 29.92 to 46.45, with 60 per cent of the samples between 33 and 40.

An abnormal sample of butter from a Cheshire herd of cows, A. SMETHAM (*Analyst, 34 (1909), No. 400, pp. 304, 305*).—The source of a sample of butter suspected of having been adulterated with foreign fats was investigated and the abnormality was found to be due to the lateness of the period of lactation. The following data show variations which may occur in unadulterated butter:

Chemical constants of butter from various sources.

Source of butter.	Reichert-Wollny figure.	Iodin number.	Saponification number.
Milk from new milch cows, Feb. 23	36.3	36.9	....
Milk from the same cows, Mar. 13	34.4	39.9	224.0
Milk in advanced stage of lactation	19.8	38.2	....
Whey butter from all the cows	30.4	38.4	224.0
Butter from whey cream and "beestings"	30.9	36.9	226.8

Camembert cheese problems in the United States, C. THOM (*Connecticut Storrs Sta. Bul. 58, pp. 317–374, figs. 6; U. S. Dept. Agr., Bur. Anim. Indus. Bul. 115, pp. 54, figs. 6*).—This is a report of the progress made in the cooperative work of the Connecticut Storrs Station in connection with the Dairy Division of this Department, and is largely devoted to an investigation of the difficulties to be overcome in the manufacture of European varieties of soft cheeses in this country. The factory equipment and conditions are described in detail and analyses of Camembert cheeses are given.

In a study of the quality of milk necessary for the manufacture of Camembert cheese and the use of starters it was found that gassy curds prevalent in January, February, and March were due to the presence of the coli-aerogenes group of bacteria, *Bacillus lactis acidi* failing to develop. For the successful manufacture of Camembert cheese more attention should be given to the production of the starter in these cold months. "The introduction of 0.5 per cent or slightly more pure starter with ripening over night at 50 to 57° F. has produced sufficient ripening to reduce gas formation to a minimum, without raising the acidity test (phenolphthalein) above 0.22 to 0.23 per cent."

In new factories the milk should be inoculated with Camembert mold spores, but when once in the factory the mold will propagate itself. Undesirable molds can be kept out only by strict cleanliness in the factory. The best temperature for the factory is from 52 to 58° F., but the humidity of the air in the ripening

room is more important than temperature. The point of equilibrium of vapor tension differs with cheeses of different water content, being considerably higher for cheeses at 60 per cent water content than for cheeses at 50 per cent. "In one experiment about 150 gm. of cheese testing about 65 per cent water evaporated at the rate of 1 gm. per day, whereas a similar amount of cheese testing about 10 per cent less lost weight at the rate of only 0.3 gm. per day in the same room at a relative humidity approximating 88 per cent. Although the temperature was low, the sample high in water content showed marked signs of decay in 10 days under these conditions. A relative humidity of 88 per cent was manifestly too high to handle cheese as wet as this. The other was found in excellent condition."

It is believed that the limits as to relative humidity are from about 83 to 90 or 92 per cent, the optimum depending upon the temperature selected and the water content of the cheeses. "For cheeses evenly drained and fairly firm at beginning of ripening (perhaps 57 to 59 per cent water) probably the optimum would be 86 to 88 per cent relative humidity at 52 to 54° F."

Successful ripening depends upon the balance of the activities of the bacteria and mold. Climatic conditions in America are so different from those of France that ripening rooms adapted to French conditions would not be successful here. Of a number of cities studied, San Francisco alone was found to have conditions approaching those of the Camembert district of France. In other places factories must have a better control of the temperature and humidity than those in France. This can be obtained by better insulation of the rooms.

Experiments show that Camembert cheese can be cooked or canned and thus a loss may be prevented, which has often occurred in the past when the cheese is overripe. Although good Camembert cheese can be made on the farm the difficulty of making a uniform product is greater when working on a small scale.

A bibliography of the literature on the subject is appended.

Cheese making with pasteurized milk, C. MARTIN (*Wiener Landw. Ztg., 59 (1909), No. 78, p. 773*).—This is a review of the work of Gorini, Mazé, Jenssen, and other investigators on making Parmesan, Roquefort, and other cheeses from pasteurized milk.

Making soft cheese from pasteurized milk, P. GUÉRAULT (*Wiener Landw. Ztg., 59 (1909), No. 79, p. 782*).—The method of making soft cheese as described is based on the theory of Mazé (E. S. R., 17, p. 291) and has been used by the author for the past 2 years. The quality of the cheese made in the summer is much superior to that made from milk not pasteurized.

VETERINARY MEDICINE.

On the increase of the hemolytic power of serums, D. EMBLETON and H. B. SHAW (*Brit. Med. Jour., 1909, No. 2548, pp. 1268–1271, fig. 1*).—"It appears possible, as a result of the experiments here described, to develop in the serums of animals into which injections have been made of the organs of another animal of the same species, a change which consists in part at least in the increase of the hemolytic power of the serum, an observation which so far as we are aware has not hitherto been made. Other changes which may occur as a result of the experimental introduction of organic extracts are being studied by us by the method of 'absorption' introduced by Ehrlich and Morgenroth.

"Further, as shown by the above experiments, the emulsions of different organs appear to have different powers of checking the hemolytic property of such experimental serums, the kidneys possessing the greatest and the liver the least power, while the spleen and heart occupy an intermediate position,

and are equally or nearly equally potent; it would appear from one of the experiments that the organs so effective are not limited to those of the guinea pig. The nature of this body or bodies is also being investigated by us.

"The form of these experiments may prove of use in determining the strength of the hemolytic power of an experimental serum. Instead of estimating the titer by reference to red corpuscles, this may be done by estimating the titer in terms of extracts of organ."

On the toxicity of castor-bean meal, MIESSNER (*Abs. in Rec. Méd. Vét., 86 (1909), No. 9, pp. 334–336*).—The author has conducted experiments to determine the amounts of castor-bean meal which are fatal when fed to domestic animals, and summarizes in the following table the amounts found to be fatal when administered at a single meal.

Doses of castor-bean meal causing death in domestic animals.

Species.	Fatal doses per kilogram.	Absolute mean fatal dose.	Species.	Fatal doses per kilogram.	Absolute mean fatal dose.
	Grams.	*Grams.*		*Grams.*	*Grams.*
Fowl	14.0	18.0	Sheep	1.25	30.0
Goat	5.5	105.0–140.0	Rabbit	0.7–1	1.5
Duck	4.0	7.4	Calf	.5	15.0–20.0
Shoat	2.3–2.4	15.0– 20.0	Goose	.4	1.1
Cow	2.0	350.0–450.0	Horse	.1	30.0–50.0
Hog	1.3–1.4	60.0			

Diseases of domestic animals [in Japan], C. SHIMOOKA (In *Agriculture in Japan. Tokyo: Govt., 1908, pp. 338–346*).—According to the statistics given, the diseases of domestic animals most prevalent in Japan are anthrax, farcy, and rinderpest, while symptomatic anthrax appears to be increasing from year to year. Foot-and-mouth disease, swine erysipelas, and rabies also occur, but hog cholera, sheep pox, and pleuro-pneumonia have not been reported.

The diseases of the eye in domesticated animals, H. GRAY (*Vet. Rec., 21 (1909), No. 1082, pp. 678–688*).—An account presented at the meeting of the Central Veterinary Medical Society at the Royal College of Veterinary Surgeons, April, 1909.

The bacteriological diagnosis of anthrax by cultures from the skin, A. CIUCĂ *and* G. STOICESCU (*Arhiva Vet., 6 (1909), No. 2, pp. 71–85; abs. in Vet. Rec., 22 (1909), No. 1095, pp. 3, 4*).—The authors have drawn the following conclusions from the investigations here recorded:

"The vegetative form of the anthrax bacillus does not endure for more than 48 hours within the carcasses of animals dead of anthrax, on account of the putrefactive processes which take place in the cadaver. In the capillaries of the skin, it endures longer, and can there find conditions suitable for sporulation later. The spores of the anthrax bacillus in the skin resist the action of atmospheric agents and of chlorid of sodium for more than a year. The bacteriological diagnosis of anthrax is always possible by cultures from the skin of putrefied carcasses, stretched upon a piece of wood to dry, and sent to laboratories. This method should be adopted as soon as possible for the diagnosis of anthrax in suspected carcasses when immediate investigations can not be undertaken—especially in summer, when the organs rapidly putrefy despite all precautions."

Vaccination against anthrax, A. BÁLINT (*Állatorvosi Lapok, 31 (1908), No. 24, pp. 298, 299; abs. in Bul. Inst. Pasteur, 7 (1909), No. 6, p. 268*).—The author has vaccinated more than 6,000 animals with Pasteur's vaccines without failure

or accident, but intends to resort in the future to the method of Sobernheim by which immunity can be conferred through a single treatment. He recommends the injection separately of 5 cc. of serum and ½ cc. of the culture. The serum can be used as a curative agent.

The chemotactic power of the toxin produced by Sclerostomum bidentatum and its larvæ on the polynuclear eosinophiles, G. VALLILLO (*Arch. Wiss. u. Prakt. Tierheilk., 34 (1908), No. 5-6, pp. 505-525; Clin. Vet. [Milan], Sez. Sci., 31 (1908), No. 6, pp. 257-279; abs. in Rec. Méd. Vét., 86 (1909), No. 5, p. 184*).—The toxin produced by *S. bidentatum* possesses a positive chemotropism for the polynuclear eosinophile leucocytes. It has no chemical relation to the toxin produced by the glanders bacillus, which exercises chemotaxis principally upon the neutrophile leucocytes. The gray translucent nodules in the lungs of the horse are not produced by the glanders bacillus but exclusively by a toxin produced by *S. bidentatum*.

Comparative investigations of the nodules and neoplastic lesions of the intestines of the horse in their relation to glanders, P. HUMMEL (*Arch. Wiss. u. Prakt. Tierheilk., 34 (1908), No. 5-6, pp. 550-580, pls. 3; abs. in Rec. Méd. Vét., 86 (1909), No. 5, p. 184*).—It is concluded that the nodules and neoplastic lesions of the intestines of the horse are usually of parasitic origin. The lesions of the intestinal wall produced by entozoa are always characterized by the appearance of eosinophiles. Glanderous lesions of the mucous membrane of the intestines appear to be very rare.

Contribution to the pathological anatomy of rinderpest, S. ARLOING and V. BALL (*Arch. Méd. Expt. et Anat. Path. [Paris], 20 (1908), No. 6, pp. 693-715, pls. 4; abs. in Rec. Méd. Vét., 86 (1909), No. 9, pp. 333, 334*).—A study of the disease, which ravaged Egypt in 1904 and 1905.

The therapeutic immunity reaction in the differentiation of trypanosome species, B. T. TERRY (*Jour. Expt. Med., 11 (1909), No. 6, pp. 802-809*).—"It is evident that the guinea pig is an unfavorable animal in which to preserve the virus, if the therapeutic immunity reaction is to be employed in the differentiation of trypansome species, for the experiments clearly show that trypanosomes of common origin, never in contact with medicaments of any sort, may behave like different species after having been preserved in these animals for 1 year."

Preliminary note on Trypanosoma eberthi (=Spirochæta eberthi) and some other parasitic forms from the intestine of the fowl, C. H. MARTIN and MURIEL ROBERTSON (*Proc. Roy. Soc. [London], Ser. B, 81 (1909), No. B 549, pp. 385-391, pl. 1*).—In a preliminary investigation the authors examined the cecal and rectal contents of 14 fowls of various ages and at various stages of digestion. During the investigation flagellate parasites of 4 types were found in the cecum.

In 3 of these types large numbers of individuals were found in which the characters of each group were sharply marked; at the same time numerous transitional forms were found. The first form, which the authors considered to be *T. eberthi*, is characterized by a rather elongated body, a very well marked undulating membrane along the edge of which a flagellum runs from the anterior end of the animal to end freely at the posterior end. A second form (Trichomonas condition) is described as a typical Trichomonas of variable size, apparently resembling the form described by Wenyon from the mouse. The third form (Monocercomonas condition) is roughly egg shaped. The fourth form was a sharply marked type, found in small numbers on two occasions, with an anterior and posterior trailing flagellum which can be coiled around the body. It is of very small size, roughly half the size of the smallest first form seen, and of approximately torpedo shape. Every fowl examined was found infected with one or other of these flagellate forms.

In addition to these forms small, rounded, generally motionless forms were met with in which the typical nucleus and blocks of the first form were seen. Infection is probably only effected by food contaminated by feces containing cysts of the parasite.

Trypanosoma ingens n. sp., D. Bruce et al. (*Proc. Roy. Soc.* [*London*], *Ser. B, 81* (*1909*), *No. B 549, pp. 323, 324, pl. 1*).—This species was found in the blood of a reed buck, a bush buck, and an ox at Namukekera, Uganda.

Experiments and observations on the development of Trypanosoma lewisi in Hæmatopinus spinulosus, F. S. H. Baldrey (*Arch. Protistenk., 15* (*1909*), *No. 3, pp. 326–332, figs. 2; abs. in Sleeping Sickness Bur.* [*London*], *Bul. 9, pp. 323, 324*).—The author thinks that the mechanical transmission of *T. lewisi* by lice is an exception.

Toxin formation in trypanosomiasis (*Sleeping Sickness Bur.* [*London*], *Bul. 9, pp. 326–328*).—A brief review of the literature on the subject.

Further results of the experimental treatment of trypanosomiasis; a progress report to a committee of the Royal Society, H. G. Plimmer and W. B. Fry (*Proc. Roy. Soc.* [*London*], *Ser. B, 81* (*1909*), *No. B 549, pp. 354–371*).—This is a continuation of experiments with the same strains of surra as previously noted (E. S. R., 20, p. 985).

Rats were treated with antimony and several of its compounds, with quassia, and with arsenophenylglycin. Dogs used in experiments with antimony were found to be extremely susceptible both to the disease and to antimony.

Further experiments upon the drug treatment of canine piroplasmosis, G. H. F. Nuttall and S. Hadwen (*Parasitology, 2* (*1909*), *No. 3, pp. 229–235*).—A continuation of work previously noted (E. S. R., 21, p. 488).

"Trypanblau injected subcutaneously into dogs a day before or a day after they have been inoculated with blood containing *Piroplasma canis* effectually prevents the development of piroplasmosis by destroying the parasites at the onset of infection. Trypanblau given by the mouth is ineffective, since it exerts no apparent influence either upon the parasite or upon the course of the disease. Tryparosan, when injected subcutaneously or when given by the mouth, has no effect upon the parasite and is ineffective as a remedy against piroplasmosis in the dog."

The drug treatment of piroplasmosis in cattle, G. H. F. Nuttall and S. Hadwen (*Parasitology, 2* (*1909*), *No. 3, pp. 236–266, charts 7*).—"Trypanblau promises to be an efficient remedy for bovine piroplasmosis, since it exerts a direct and obvious effect upon the parasites. The effect of the drug upon *Piroplasma bovis* is similar to that which it produces upon the canine parasite. As in canine piroplasmosis, the disappearance of the parasites from the blood may be temporary. The parasites also disappear and reappear in small numbers (after 2 to 11 days) in animals undergoing natural recovery. In 3 treated animals the parasites reappeared in exceedingly small numbers after 5 to 6 days; in 2 they had not reappeared after 16 and 18 days, respectively. The animals show no symptoms and progress toward recovery. Although doses of 150 to 200 cc. of a saturated watery solution of the dye were used, it is probable that smaller doses will prove efficient. The drug appears to produce no ill effects upon cattle."

The discovery of a remedy for malignant jaundice in the dog and for redwater in cattle, G. H. F. Nuttall and S. Hadwen (*Proc. Roy. Soc.* [*London*], *Ser. B, 81* (*1909*), *No. B 549, pp. 348–350*).—More detailed accounts are noted above.

Tests concerning tubercle bacilli in the circulating blood, E. C. Schroeder and W. E. Cotton (*U. S. Dept. Agr., Bur. Anim. Indus. Bul. 116, pp. 23*).—Investigations conducted in order to determine whether tubercle bacilli occur in the circulating blood are here reported in detail.

During the course of the investigation tests were made of 42 tuberculous bovines by transferring their blood as rapidly as possible to the peritoneal cavities of guinea pigs. The results obtained have been summarized as follows:

"We failed utterly to find tubercle bacilli in the blood of tuberculous cattle which we examined microscopically in accordance with the method described and used by Doctor Rosenberger.

"The negative results of our microscopic examinations are confirmed by the negative results obtained with 95 guinea pigs, each of which received an intraabdominal injection of blood from a tuberculous cow or bull.

"As the number of cattle from which blood was injected into the 95 guinea pigs was 42, and as these cattle represented practically all stages of tuberculosis from mildly affected recent cases to old and completely generalized cases, we feel that our work shows beyond the remotest doubt that tuberculosis is not to be classified, in any sense of the word, as a bacteriemia."

In an appended note mention is made of an independent investigation by Dr. J. R. Mohler, in which the blood of 8 infected cattle was examined microscopically and the blood of each animal injected into 5 guinea pigs. Four of the cattle used were slaughtered for meat, but upon inspection were found to be so extensively affected with tuberculosis that it was necessary to condemn and tank their carcasses under the Federal meat-inspection regulations. The other 4 were passing tubercle bacilli from their bowels. However, no tubercle bacilli were discovered microscopically and not one of the 40 injected guinea pigs contracted tuberculosis.

Investigations of the tubercle bacillus in cattle, E. Rothhaar (*Untersuchungen über Tuberkel-Bazillen beim Rinde. Inaug. Diss., Univ. Bern, 1908, pp. 25+XLII; rev. in Bul. Inst. Pasteur, 7 (1909), No. 9, p. 398*).—The author confirms the work of Kossel, Weber, and Heuss (E. S. R., 15, p. 614) on the characters peculiar to the bovine type of the tubercle bacillus.

A bibliography of 34 titles is appended.

The anatamo-pathological forms of bovine tuberculosis, H. Vallée and P. Chaussé (*Rev. Gén. Méd. Vét., 13 (1909), No. 148, pp. 177–185; abs. in Bul. Inst. Pasteur, 7 (1909), No. 9, p. 396*).—During a 2 years' investigation of the forms of bovine tuberculosis, 700 cases were studied. Two forms, the hypertrophic and the nodular, were distinguished, 16 per cent of the cases belonging to the former and 84 per cent to the latter class.

Tuberculous lesions of the bovine trachea, A. Chrétien (*Hyg. Viande et Lait, 3 (1909), No. 3, pp. 97–102, fig. 1; abs. in Vet. Rec., 21 (1909), No. 1085, pp. 726–728*).—The author calls attention to the prevalence of tuberculous lesions of the bovine trachea and describes their nature.

Tuberculosis of sheep, R. Mayer (*Die Schaf Tuberkulose. Inaug. Diss., Univ. Bern, 1908, pp. 71, pl. 1; rev. in Bul. Inst. Pasteur, 7 (1909), No. 9, p. 396*).—Tuberculosis is extremely rare in sheep, being found in less than 0.1 of 1 per cent. The author here describes very completely 9 cases observed personally. The lesions seem to indicate that the affection originates in the alimentary canal, the animals being infected while young through cow's or ewe's milk. The bacilli, which are apparently of the bovine type, are rare and often degenerate.

A bibliography of 148 titles is appended.

Tuberculosis in a panther, Bergeon (*Rev. Vet. [Toulouse], 34 (1909), No. 2, pp. 93–95*).—An account of the disease in a 3-year-old panther which had been in captivity for about 16 months, at the Saigon botanical garden.

Dissemination of tuberculosis by the manure of infected cattle, A. T. Peters and C. Emerson (*Nebraska Sta. Rpt. 1908, pp. 135–142*).—In the investigations here reported 41 animals were used, the majority of which were in

excellent condition, the fact that they were suffering from the disease being indicated only by the tuberculin test.

In 22 of these cases, acid-fast bacilli morphologically similar to the tubercle bacillus were demonstrated by the microscope as present in the manure. Subsequent inoculation tests, however, showed that in but 3 of these cases were the cows passing virulent tubercle bacilli, which result indicates that a microscopic examination alone is untrustworthy in the determination of the presence of tubercle bacilli in cow manure.

Of the 3 animals which were passing virulent tubercle bacilli in their feces, 2 were in good physical condition. In one of these the disease would not have been suspected from her appearance, yet the feces contained large numbers of acid-fast rods, some of them virulent tubercle bacilli. The second, a male of exceptionally fine appearance, suffered from a persistent but moderate cough. The third, a cow, was thin but the symptoms of the disease were not marked. In this case the number of acid-fast bacilli in the feces as revealed by the microscope was exceedingly large.

The authors conclude that "hogs should not be permitted to run in the same pen with cattle, especially if the latter are known to be tuberculous. Dairy products from tuberculous cows, even though there is no infection of the udder, are a source of danger to man. The number of tuberculous cows which show no symptoms of disease but which excrete virulent tubercle bacilli in their manure is sufficiently large to make this an important factor in the control of tuberculosis."

The frequence and detection of tuberculosis of the bones in slaughtered animals, G. Stroh (*Ztschr. Fleisch u. Milchhyg., 19 (1909), No. 8, pp. 265–271*).—The author here reports studies conducted from 1902 to 1908 at the Augsburg abattoir.

The ophthalmo, cuti, and vaginal reaction in tuberculosis, J. Richter (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 5 (1909), No. 3–4, pp. 243–288; abs. in Bul. Inst. Pasteur, 7 (1909), No. 9, p. 400*).—The author thinks that the use of concentrated preparations is necessary, as he finds the undiluted tuberculin suitable for the ophthalmo, cuti, and vaginal reactions. For the ocular and vaginal tests the best results were obtained from the tuberculol D and tuberculin Dohna; for the cuti reaction the tuberculin of Hœchst and tuberculin Dohna. He does not think that the local tests should be substituted for the subcutaneous.

Application of the precipitin reaction of Bonome to the diagnosis of tuberculosis and to the differentiation of the human and bovine types of the tubercle bacillus, Dammann and Stedefeder (*Deut. Tierärztl. Wchnschr., 17 (1909), No. 2, pp. 17–19; abs. in Bul. Inst. Pasteur, 7 (1909), No. 9, p. 399*).—After repeating the experiments of Bonome (E. S. R., 18, p. 1163), the authors find that they can not recommend the use of his precipitin reaction as a means for diagnosing tuberculosis and much less as a means for distinguishing between human and bovine types of the bacillus.

The intradermal reaction to tuberculin, Vallée, Declaire, and Herbet (*Bul. Soc. Cent. Méd. Vét., 86 (1909), No. 6, pp. 107–115*).—The authors find this to be a very exact method of obtaining Pirquet's cutaneous reaction and think that it should be used in practice in preference to all others.

Potassium iodid and tuberculin, F. Sorel (*Ann. Inst. Pasteur, 23 (1909), No. 7, pp. 533–546, chart 1*).—The author finds that the reaction of tuberculous guinea pigs to iodid of potassium is apparently caused by a specific product. This product is not tuberculin.

A new contribution to the study of the defects of tuberculin, J. Lignières (*Bul. Soc. Cent. Méd. Vét., 86 (1909), No. 6, pp. 91–103*).—The author considers

a positive reaction to the subcutaneous injection of tuberculin to be of absolute value. From 5 to 8 per cent of tuberculous animals do not react to the subcutaneous injection even when those fraudulently injected and those tested within 30 days have been eliminated. Subcutaneous injections should, in his opinion, be supplemented by local tests.

A new contribution to the study of the local reactions to tuberculin, J. Lignières (*Bul. Soc. Cent. Méd. Vét., 86 (1909), No. 8, pp. 146–167*).—The author here discusses at some length the cuticular, ophthalmic, dermic, local, subcutaneous, and intradermal reactions to tuberculin. Much of the substance of this account is included in the following abstract.

New methods of employing tuberculin in the diagnosis of tuberculosis, J. Lignières (*Bul. Soc. Cent. Méd. Vét., 86 (1909), No. 10, pp. 206–217; Jour. Compar. Path. and Ther., 22 (1909), No. 3, pp. 237–245*).—After discussing this subject at some length and considering the results obtained in a number of individuals the author draws the following conclusions:

"In practice the thermal reaction and the local reaction to tuberculin form a satisfactory means of diagnosing tuberculosis. No single method is sufficient in itself. It is absolutely necessary to employ several, capable of mutually controlling one another, in order to increase the chances of a positive diagnosis. This forms the method of associated reactions. The choice of tests must depend on the conditions under which the investigator is working, but the ophthalmic test should always be employed, and, if possible, repeated. The thermal reaction resulting from subcutaneous injection should always be supplemented by the local-subcutaneous test.

"The diagnosis of tuberculosis depends absolutely on the development of a clearly marked positive reaction, of whatever kind. In practice negative results have no significance in face of a single well-marked positive reaction. If, when employing the associated method, several reactions prove positive the operator's confidence in his diagnosis is increased, and he is encouraged to carry out the necessary sanitary measures in their entirety. Doubtful reactions are of great importance. They enable us to segregate the animals for the purpose of carrying out further investigations or repeating certain tests under more favorable conditions. The ophthalmic reaction is the best method of detecting tuberculosis in herds of animals which live in the open throughout the year. It can be repeated quite frequently, and each time enables us to reduce the number of doubtful cases, and so, by reducing the total number, to employ other tests.

"The local tests which do not influence the thermal reaction, such as the cuticular, dermic, and especially the ophthalmic test, can be employed shortly before the subcutaneous injection; while local tests which might interfere with the general thermal reaction, such as the local subcutaneous and the intradermic tests, should not be employed in practice if one wishes soon afterwards to obtain the best results from an ordinary subcutaneous injection. All the local tests may give positive results in tuberculous subjects even when the animals are simultaneously injected in the ordinary way (that is, subcutaneously. The ophthalmic test is least affected by a subcutaneous injection, and the intradermic the most. As a general rule, it is desirable to wait a certain time before applying one of the local tests to an animal which has recently received an ordinary subcutaneous injection, but 3 to 4 days after a subcutaneous injection the cuticular, dermic, and especially the ophthalmic reactions may be used with success. The local-subcutaneous and the intradermic are much more influenced by a previous injection of tuberculin. Twelve to 14 days, and sometimes much more, should be allowed to lapse if one wishes to insure the best conditions.

"One of the simplest, most practical, and most certain of the associated methods consists in simultaneously carrying out about 8 p. m. an ophthalmic test, then at the base of the neck making a dermic injection, and finishing up by injecting tuberculin subcutaneously at the same point. The following morning about 5 or 6 o'clock one begins by looking for the ocular reaction, next observes the local-subcutaneous reaction, and finally takes the temperature. It is much more difficult for tuberculous patients to escape detection under such associated tests than under any single one."

Vaccination of cattle against tuberculosis, RAPPIN (*Compt. Rend. Soc. Biol. [Paris], 66 (1909), No. 10, pp. 410, 411; Compt. Rend. Acad. Sci. [Paris], 149 (1909), No. 6, pp. 408–410*).—Favorable results are said to have been obtained from the vaccination of bovines with bacilli modified through the use of sodium fluorid.

Ovariotomy in the goat, P. J. OCEANN (*Abs. in Vet. Jour., 65 (1909), No. 408, pp. 318, 319*).—An account of the operation, which has the following objects in view: "In order to cure the goaty smell of milk—ovariotomy is the simplest, least costly, and quickest method in its effect; in order to incite milk secretion and lengthen its continuance, which lasted on an average from 13 to 15 months in the goats operated on . . .; in order to favor fattening and profit on the flesh, which becomes better in quality and without bad taste and goaty smell; in order to favorably influence the physiological milk-forming elements—while the quality of butter and casein increases, the lactose is diminished."

Experiments with specific serums in immunizing against hog cholera, A. STADIE (*Berlin. Tierärztl. Wchnschr., 25 (1909), No. 6, pp. 113–123; abs. in Bul. Inst. Pasteur, 7 (1909), No. 6, p. 268*).—Cattle, sheep, and hogs were used in the attempt to obtain an immunizing serum, but the serums obtained failed to give satisfactory results in practice.

A study of a serious anemic disease among horses, W. B. MACK (*Amer. Vet. Rev., 36 (1909), No. 2, pp. 222–247, charts 2*).—A paper presented at the nineteenth annual meeting of the New York State Veterinary Medical Association at Ithaca, August, 1909. A more detailed account has previously been noted (E. S. R., 21, p. 584).

A note on Argas larvæ which attack fowls in Persia, C. CARRÉ (*Bul. Soc. Cent. Méd. Vét., 86 (1909), No. 8, pp. 172, 173*).—Argasids appear to be very widespread at Téhéran where they occasionally cause considerable loss of poultry.

Regulations governing entrance to the veterinary inspector examination (*U. S. Dept. Agr., Bur. Anim. Indus. Circ. 150, pp. 11*).—The regulations relating to the matriculation examination and course of instruction required in veterinary science at veterinary schools and colleges to educate and qualify persons for the civil-service examination for the position of veterinary inspector in the Bureau of Animal Industry of this Department are here promulgated. These regulations include a list of the institutions at present accredited to supply graduates eligible to enter these examinations.

RURAL ENGINEERING.

A report on irrigation laws and litigation in Nevada, H. THURTELL and G. H. TRUE (*Nevada Sta. Bul. 69, pp. 7–57*).—This bulletin gives the history of irrigation legislation in the State of Nevada, beginning with a law enacted in 1866 providing for the recording of claims to water, summarizes the filings under this law and a subsequent law enacted in 1889, reviews litigation regarding irrigation, and gives a synopsis of the present law, which was enacted in 1903

and has been amended since that time. The principal provisions of the present law are as follows:

"(1) All natural water courses and natural lakes, not in private ownership, belong to the public, and are subject to appropriation for a beneficial use.

"(2) The right to the use of water so appropriated for irrigation shall be appurtenant to the land irrigated and beneficial use shall be the basis, the measure, and the limit of the right.

"(3) The office of state engineer is created.

"(4) The state engineer shall prepare for each stream a list of the appropriations of water according to priority.

"(5) The state board of irrigation shall divide the State of Nevada into water districts and may appoint water commissioners to divide the water according to the adjudications."

Provision No. 4 has been interpreted to empower the state engineer to determine what rights are in existence and the bulletin describes this determination for the Walker River, which was the first to be decided.

Irrigation in Idaho, J. STEPHENSON, Jr. (*U. S. Dept. Agr., Office Expt. Stas. Bul. 216, pp. 59, pl. 1*).—This is one of the series of reports on irrigation in the different States and Territories of the arid region, prepared especially for prospective settlers on the irrigated lands in those States. It discusses climate, water supply, agricultural resources, irrigated lands, and the various irrigation projects which are providing the water supplies for these lands.

Drainage of irrigated lands in the San Joaquin Valley, California, S. FORTIER and V. M. CONE (*U. S. Dept. Agr., Office Expt. Stas. Bul. 217, pp. 58, pls. 2, figs. 9*).—This bulletin gives the results of experiments in reclaiming lands at Fresno and in the Modesto and Turlock irrigation districts, which were formerly productive but which had been injured by the rise of ground water and the accumulation of alkali. The experiments reported form a part of the cooperative irrigation and drainage investigations carried on by the Office of Experiment Stations and the State of California.

In the Fresno district, lands which were formerly in highly productive vineyards, valued at $350 per acre up, had ceased to produce crops and were held at values as low as $15 and $20 per acre, and used for pasture. In the Modesto and Turlock districts a similar injury was beginning to be done, although these lands had been under irrigation but a few years. The experiments were undertaken for the purpose of working out methods of keeping down the level of the ground water and removing from the soil the alkali which had accumulated on account of the heavy evaporation with the ground water near the surface.

At Fresno the ground water rises from about the first of the year to the first of May and from that time until the end of the year falls again. It remains, however, within less than 4 feet of the surface for about half the year, thus submerging the roots of plants and hindering their growth or destroying them entirely. The experiments consisted of putting in tile drains leading to sumps, from which the drainage water was pumped, with the object of holding the ground water level below the root zones of plants, and the application of water to wash the accumulated salts from the soil into the drains and thus have it carried out through the pumps. Such experiments were carried out on two tracts, one of which had ceased to bear any vegetation and the other of which was rapidly becoming so wet that crops were dying. In both cases the conditions were so far relieved that good crops were grown. The report discusses methods of putting in the drains, giving data as to cost. On the basis of these experiments, which cover quite small areas, recommendations for the treatment of all the affected areas in the Fresno district are made.

The work in the Modesto and Turlock districts, discussed in the report, was done principally by the district organizations, with the advice of this Office, and consisted in the digging of open ditches to take away surplus water and hold the level of the ground water below the danger limit. The method of digging these ditches and cost data are given.

Drainage of irrigated lands, C. F. BROWN (*U. S. Dept. Agr., Farmers' Bul. 371, pp. 52, figs. 19*).—This supplements Farmers' Bulletin 187, previously noted (E. S. R., 15, p. 934) on the drainage of farm lands, and reports studies carried on in Utah with a variety of soils and conditions on the drainage of irrigated lands which had been seriously injured or rendered wholly unproductive by the seepage of irrigation water or by the rise of alkali, or by both combined. The work was conducted under the supervision of the Drainage Investigations of this Office in cooperation with the Utah Station, and a portion has been previously noted in Bulletin 99 of the Utah Station (E. S. R., 18, p. 1166).

Details are given as to the plans, construction, cost, and results of the drainage of the various irrigated tracts, together with a brief description of methods employed in other States and a discussion of the principles and practice underlying the drainage of these lands.

It is stated that not less than 150,000 acres of irrigated land in Utah have been ruined or seriously injured by seepage or alkali, and will require drainage in order to restore them to a productive state, while in all the other irrigated States from 10 to 20 per cent of the land which has been under irrigation for 10 years or more requires drainage. The experiments reported indicate that drainage of these lands is profitable. The cost varied with the conditions, but in most cases was about $15 per acre.

"Success is dependent upon correct plans and proper construction of drains. Careful and systematic surveys and subsoil examinations should never be omitted. The form of drain or section of ditch should be chosen with reference to its efficiency in the particular soil formation and water conditions.

"The subsequent care and treatment of drains and lands will also determine the ultimate success. . . . Drainage systems in arid countries, where irrigation is practiced, require watching and treatment after they are laid. The care is necessary in relation to surface waters, and the treatment of lands necessary when they are affected with alkali."

Pumping plants for irrigators, G. E. P. SMITH (*Arizona Sta. Bul. 60, pp. 399–411, figs. 3*).—This discusses the sinking and curbing of wells, pumps, strainers, and power plants.

RURAL ECONOMICS.

Replanning a farm for profit, C. B. SMITH and J. W. FROLEY (*U. S. Dept. Agr., Farmers' Bul. 370, pp. 36*).—This bulletin suggests six different farming systems for a run-down 80-acre farm in central Illinois, with the estimated expenditures and returns of each type.

The total income of the whole farm in 1908, estimating crops at average prices, was less than $450 per year, whereas the estimated gross incomes from the different types of farming proposed, after deducting the cost of fertilizers or feeding stuffs, range from $862 to $2,334 per year. The results of the inquiry are summarized as follows:

"Habit frequently continues a type of farming in a community long after that type has become unprofitable.

"Changes in the farm system are often deferred (1) because of lack of knowledge of how to replan the farm, (2) because of lack of funds in carrying out new plans, (3) because new fences, buildings, or equipment are called

for in the new plan, and (4) because a change frequently requires a readjustment of many of the usual ways of thinking and doing.

"In replanning the farm, help may be obtained from visits to successful farms, from farm literature, agricultural papers, the state experiment stations, the agricultural colleges, the United States Department of Agriculture, and from agricultural experts.

"The farm can be as successfully planned as other businesses are, provided the plans are made to cover average conditions over a period of years.

"Profitable farming results from good farm plans comprehending every feature of the farm carefully coordinated and effectually carried out.

"A good farm plan provides (1) a reasonable reward for the capital and labor invested and (2) the maintenance or increase of soil fertility, and (3) it must be within the comprehension and ability of the owner to carry out.

"The income from the same farm can often be doubled or trebled without increased expense by adopting a system of farming suited to the land, the locality, and the owner."

Landowner and tenant, J. N. McBride (*Breeder's Gaz., 56 (1909), No. 15, p. 686*).—The evils of the present tenant system on farms are pointed out in this article, and the organization of farm stock companies between landowner and tenant with the rights of each carefully defined by contract is advocated. It is believed that this plan would secure to the tenant the rewards of his investment and the maximum value of his labor, while the landowner would receive the maximum return on the land, maintain the fertility of the soil, and retain an equal voice in the management of his own farm.

The problem of small landownership, L. N. Modona (*Atti R. Accad. Econ. Agr. Georg. Firenze, 5. ser., 6 (1909), No. 3-4, pp. 319-408*).—This article reviews the history of legislation in France, Belgium, Denmark, England, Norway, Australia, New Zealand, and Italy with regard to changes in land owning and particularly with reference to small holdings. The progress which has been made by the governments of the different countries for the encouragement and protection of small landowners and their families is described in detail. The study of the American homestead system and its adoption with certain modifications to meet rural conditions in Italy and other European countries are advocated. The results of legislation in the different countries are shown to have improved agricultural conditions, prevented rural depopulation, and promoted national welfare.

An extensive bibliography relating to agrarian legislation in various countries is included.

The operation of the small holdings act during 1908 (*Jour. Bd. Agr. [London], 16 (1909), No. 7, pp. 575-579*).—"The result of the first year's work since the small holdings and allotments act, 1907, came into operation, has been that 23,285 applications have been received by county councils for 373,601 acres; that 13,202 applicants have been approved provisionally as suitable; that the estimated quantity of land required for the suitable applicants is 185,098 acres; that 21,417 acres have been acquired by county councils, of which 11,346 acres have been purchased for £370,965, and 10,071 acres leased for total rents amounting to £11,209; that the land acquired will provide for about 1,500 of the applicants; and that 504 of them were in actual possession of their holdings on December 31, 1908."

Government loans in Russia, J. W. Ragsdale (*Daily Cons. and Trade Rpts. [U. S.], 1909, No. 3619, p. 6*).—The principal stipulations of a new project for furnishing credit for agricultural and agrotechnical purposes in Russia are reported.

The ministry of agriculture is to be allowed $1,030,000 annually for 10 years as a special fund from which loans will be made for: (1) Agricultural im-

provements such as draining, irrigation, and clearing land; (2) improvements in such special branches of rural economy as horticulture, sylviculture, and cattle breeding and the organization of mills, dairies, and establishments for the working of timber; and (3) construction of elevators, warehouses, kilns, etc., for facilitating the export of the products of rural economy. These loans can be made through zemstvos, rural and credit associations, and various agricultural organizations to an amount not exceeding 75 per cent of the cost of the proposed improvement at 4½ per cent interest. On loans for the improvement of roads only 2 per cent interest is to be charged. The loans may run from 5 to 30 years and are secured by mortgage of lands if the loan exceeds $500, or if less by a simple bill of exchange.

The insurance of farm laborers against accidents at their work, I. Bandini et al. (*Bol. Quind. Soc. Agr. Ital., 14 (1909), No. 18, pp. 899–905*).—Objections raised by Professors Gioda and Ferrari to the plan of insurance proposed by I. Bandini (E. S. R., 21, p. 492) are published in letters to the editor, together with the reply of I. Bandini who not only answers the objections, but also gives additional reasons for a flexible system of insurance based upon assessed valuation of farms and adapted to the agricultural conditions and practices in the different provinces of Italy as compared with the obligatory and uniform plan proposed by the government.

The proposed law of E. Conti regarding accidents at agricultural labor, P. Ferrari (*Atti R. Accad. Econ. Agr. Georg. Firenze, 5. ser., 6 (1909), No. 3–4, pp. 261–288*).—This article discusses some of the more important features of the law proposed by Senator E. Conti regarding obligatory insurance of farm laborers against accidents at their work, points out wherein the law should be modified as regards its methods of fixing the rates of premiums, and calls attention by means of statistics and discussion to the results secured under the voluntary system by the mutual insurance societies of Vercelli and Tuscany.

The insurance of farm laborers in Switzerland against accidents at their work, J. Aguet (*Bol. Quind. Soc. Agr. Ital., 14 (1909), No. 17, pp. 838–841*).—This article presents a brief summary of legislation in Switzerland with reference to the insurance of laborers against sickness and accident, including the provisions of the law relating to agricultural laborers. The important features of the Swiss laws are compared with the provisions of the law proposed by Senator E. Conti, which favors obligatory insurance. Experience in Switzerland has shown the advantage of optional insurance, and this system is urged for Italy as more just and less burdensome to employing farmers than obligatory insurance.

Agriculture in Japan, C. Shimooka (*Tokyo: Govt., 1908, pp. X+455*).—This volume discusses the geography, governmental administrative system, population, land tenure system, condition of agriculture, agricultural products, governmental provisions for agricultural research and education, the encouragement and protection of agriculture, and the commerce in agricultural products of Japan. A table of Japanese terms relating to money, weights, and measures with English equivalents is included. The sections dealing with most of these topics are abstracted separately elsewhere in this issue.

The cultivation of tobacco from the economic point of view, D. Vigiani (*Atti R. Accad. Econ. Agr. Georg. Firenze, 5. ser., 6 (1909), No. 3–4, pp. 309–318*).—Statistics on the cost of raising tobacco in different parts of Italy, the net returns to the producer under the systems of independent farming and farming on shares, and the economic advantages to farmers in the cultivation of tobacco are discussed in this article.

Crop Reporter (*U. S. Dept. Agr., Bur. Statis. Crop Reporter, 11 (1909), No. 10, pp. 65–72*).—Notes and statistics on the condition of crops in the United States

and foreign countries, and the farm values of important products and the range of prices of agricultural products in the chief markets of the United States are reported, together with data on the production and consumption of manufactured fertilizers abstracted on page 26 of this issue.

Crop Reporter: Index to Vols. 8–10 (*U. S. Dept. Agr., Bur. Statis. Crop Reporter, Index, Vols. 8–10, pp. 15*).

According to the author its function is "to get nations to complete their crop-reporting systems, to get them to harmonize the data to the end that the institute may gather from the nations the facts regarding their crops, summarize them, and disseminate them promptly to all the world."

The progress that the institute has made in bringing about these results is briefly described and it is believed that it will be in a position to begin its regular official service in January, 1910.

[Bibliography of agriculture], ADELAIDE R. HASSE (*Carnegie Inst. Washington, Pub. 85 (Me.), pp. 11–21; (N. H.), pp. 9–12; (Vt.), pp. 11–14; (N. Y.), pp. 25–41; (R. I.), pp. 23–27; (Mass.), pp. 21–28; (Cal.), pp. 12–48; and (Ill.), pp. 33–104*).—The Index of Economic Material in Documents of the States of the United States, which is being issued by the Carnegie Institution of Washington, contains a bibliography relating to agriculture and agricultural societies. The States for which the material has been published are Maine, New Hampshire, Vermont, New York, Rhode Island, Massachusetts, California, and Illinois.

AGRICULTURAL EDUCATION.

Agricultural education in America, W. MACDONALD (*New York, 1909, pp. VII+162, pl. 1*).—This gives a brief survey of the legislation by the National Government respecting agricultural education with the results that have grown out of it, and has been prepared for the particular purpose of influencing a similar development in the Transvaal, from which country the author came to the University of Minnesota for a graduate course in agriculture. The book is a dissertation for the degree of doctor of science, and deals principally with the U. S. Department of Agriculture, agricultural endowments, the rise of Cornell University, farmers' institutes, and agricultural education in Minnesota.

Provisions relating to agricultural education, C. SHIMOOKA (*In Agriculture in Japan. Tokyo: Govt., 1908, pp. 375–383*).—A brief description is given of the system of agricultural education in Japan. This includes 2 university colleges of agriculture, 6 technical institutes or agricultural high schools, 78 common schools of agriculture for middle class farmers, 101 common schools of agriculture for small farmers, and supplementary and miscellaneous instruction in agriculture, including local agricultural institutes, peripatetic lectures, primary agricultural schools, and schools for the training of teachers of agriculture.

The teaching of agriculture in the high school, F. M. GILES (*School Rev., 17 (1909), No. 3, pp. 154–165*).—This paper recommends the use of elementary agriculture as an introduction to high-school science for the following reasons: (1) It meets the interest of adolescent pupils far better than the traditional science courses derived from the colleges; (2) it conforms better to the pedagogical order of the practical organization of facts before their philosophical organization; and (3) it secures to a larger degree the approval of school patrons. From these bases the author concludes that the agricultural instruction should explain environment rather than give technical skill, and that its educational value is as marked for city as for rural schools.

Agriculture in the high school, S. A. HARBOURT (*Jour. Ed. [Boston], 70 (1909), No. 16, pp. 430, 431*).—From the experiences and results of four years' teaching of agriculture in the Andover (Ohio) High School the author concludes that the work has increased the interest of pupils in other school subjects, led

to practical farm experimenting by them, cultivated practical judgment, and developed moral principle. Nearby farmers are now underdraining and liming their land, treating seed potatoes for scab, improving dairy herds, pruning orchards, building good roads, and caring for farm machinery. "One can not buy a secondhand agricultural book in Andover." They are kept for reference in the home library.

Public school agriculture, 1909 (*Mass. Agr. Col., Dept. Agr. Ed. [Pamphlet], pp. 32*).—This course in elementary agriculture, prepared by a committee of five appointed by the Conference on Agricultural Science at the Massachusetts Agricultural College in 1908, consists of a series of practical exercises, for each of which appropriate materials and directions are suggested. There are 54 of these exercises, covering such topics as types of soil and subsoil, plant roots and root nodules, effect of humus and lime in clay soil, determination of the percentage of water and air in soils, testing soil solutions for acidity or alkalinity, soil temperatures, capillarity and evaporation, soil drainage, transpiration in plants, study of various seeds, corn germination, variations in plant growth, improvement by selection, home gardening, grafting, pruning, and budding, plant enemies and diseases, preparation of Bordeaux mixture, milk testing, and milk bacteria.

Agriculture for common schools, M. L. Fisher and F. A. Cotton (*New York, 1909, pp. XXIII+381, figs. 93*).—The contents of this book are arranged under 5 main sections—soils, farm crops, horticulture, animal husbandry, and dairying. The last section includes a chapter on bees and 2 chapters on poultry. There are also 3 appendixes, presenting (1) digestion tables, (2) reference books, and (3) education and agriculture. The last named is a short chapter suggesting how the teacher can best use neighborhood material for adding interest and effectiveness to the teaching of reading, spelling, arithmetic, and geography.

Practical agriculture, J. W. Wilkinson (*New York, Cincinnati, and Chicago, 1909, pp. 383, figs. 165, dgms. 2, maps 5*).—This is a new text on agriculture for the common schools. In addition to the usual topics and illustrations, it has chapters on the history of agriculture, special herb and leaf crops, nut crops, civic improvement, roads and road improvement, fuel and light, and country life conveniences. An appendix contains tables of feeding standards, weights and measures, dates for crop planting, score cards for corn and cotton, and a list of apparatus and supplies for simple experiments and laboratory work. A glossary of the more unusual terms follows the appendix.

The school garden book, C. M. Weed and P. Emerson (*New York, 1909, pp. IX+320, pl. 1, figs. 107*).—This is intended as a general guide for teachers in directing school garden work and in utilizing its educational, economic, and social values in the training of children. The botanical structure of flowers is clearly illustrated. The home-gardening habit is the objective point in all the instruction given. Part 1 consists of 12 chapters under the general title, The Garden Month by Month, beginning with September, and contains cultural directions and descriptive matter concerning the principal flowers and garden vegetables. Part 2, entitled Garden Exercises for Pupils, is devoted to suggestions for carrying on the various gardening operations.

Suggestions for garden work in California schools, E. B. Babcock (*California Sta. Circ. 46, pp. 5–46, figs. 13*).—The author reviews briefly the progress of the children's garden movement, gives illustrations of successful school garden work in California, outlines a scheme successfully carried out at Chico, Cal., for the business management of school gardens through the organization of a school bank, and gives general suggestions to teachers who are beginning school-garden work as to the creation of public sentiment for the work and as to details of the work in small rural or ungraded schools and in large rural or city schools.

In the small rural schools it is recommended that both individual plats and community plats be developed, the former to be devoted to plant propagation and experimental plant improvement, and the latter to fertilizer tests, a collection of native plants, and a model kitchen garden. It is also suggested that as the pupils advance in garden work they be encouraged to start home gardens. Lists are given of crops suitable for experimental plant improvement, including field crops, vegetables, and garden fruits. For the work in large rural or city schools a graded scheme is adapted from Circular 60 of this Office, previously noted (E. S. R., 16, p. 935).

Lists are given of plants that will thrive with large amounts of water and of others that will thrive with little water, also directions as to where to obtain seeds and bulbs. There are further instructions for teachers beginning garden work as to selection of location, laying out of gardens, preparation of soil, planting seeds, bulbs, shrubs, and trees, furrow irrigation, cultivation, time necessary for garden work, means of carrying on garden work during vacation, and how to secure special preparation for teaching nature study in California. The circular closes with a bibliography of publications referred to in the text, and a list of publications of the California Station.

Agricultural extension (*Indiana Sta. Circ. 16, pp. 43, figs. 33*).—A descriptive circular containing general information relative to the work of the experiment station and school of agriculture, including a brief outline of the work of each department and summaries of recent publications.

MISCELLANEOUS.

Annual Report of Hawaii Station, 1908 (*Hawaii Sta. Rpt. 1908, pp. 84*).—This consists of the organization list, a summary by the special agent in charge as to the investigations of the year, and reports of the entomologist, horticulturist, and assistant chemist and of the experimental work with field crops, all of which are abstracted elsewhere in this issue.

Twenty-second Annual Report of Nebraska Station, 1908 (*Nebraska Sta. Rpt. 1908, pp. XXIV+158*).—This contains the organization list, a review of the work of the station during the year, a financial statement for the federal funds for the fiscal year ended June 30, 1908, for the state funds for the fiscal year ended November 30, 1908, and for the remaining funds for the fiscal year ended July 31, 1908, and special articles abstracted elsewhere in this issue.

Sixteenth Annual Report of Washington Station, 1906 (*Washington Sta. Rpt. 1906, pp. 32*).—This contains the organization list, a report of the director on the work of the year, including reports of heads of departments of which a portion of that of the chemist is abstracted on page 34 of this issue, and a financial statement for the fiscal year ended June 30, 1906.

Seventeenth Annual Report of Washington Station, 1907 (*Washington Sta. Rpt. 1907, pp. 20*).—This includes the organization list, a report of the director on the work of the year, a financial statement for the fiscal year ended June 30, 1907, a summarized report by the director on the work of the station for the past 14 years, and a list of the publications available for distribution.

Eighteenth Annual Report of Washington Station, 1908 (*Washington Sta. Rpt. 1908, pp. 15*).—This includes the organization list, a report on the work of the station during the year, and a financial statement for the fiscal year ended June 30, 1908.

Publications of the United States Department of Agriculture and how they are distributed (*U. S. Dept. Agr., Div. Pubs. Circ. 6, pp. 3*).—This gives an explanation as to the methods of distributing the various classes of publications of this Department.

NOTES.

Alabama College and Station.—J. C. C. Price has been appointed assistant in horticulture.

California University.—In connection with the short courses recently completed at Davis, the first Farmers' Week was held, beginning October 25. A special feature was a conference on rural life, at which W. A. Beard, of the recent Commission on Country Life, acted as chairman. The total attendance at the Farmers' Week and the short courses was about 200.

Colorado College.—A building 60 by 120 ft. is under construction for the department of civil and irrigation engineering, and is expected to be completed at an early date.

B. O. Longyear, professor of botany, is also to act as professor of forestry.

Georgia College.—An appropriation of $125,000 was made by the last legislature for maintenance during the ensuing biennium. Of this sum, $10,000 is for extension teaching, which with funds available from other sources will supply about $14,000 a year for this purpose. As a result of these appropriations departments of chemistry and veterinary medicine have been organized, the college staff is being increased, and much needed equipment is being added.

W. A. Worsham, jr., who is a graduate of the University of Georgia, and has received the M. S. degree at Harvard University, has been appointed adjunct professor of chemistry; and Dr. A. G. G. Richardson, formerly connected with the Bureau of Animal Industry, of this Department, has been appointed professor of veterinary medicine.

J. E. Hite, formerly of the Tennessee Station, assumes charge of extension work, with Thomas A. Early in charge of school extension, A. Maclaren in charge of dairy extension, and S. A. Minear in charge of horticultural extension work, and R. L. Nixon as assistant in the organization and direction of institute work. This will give a staff of five men devoting their time exclusively to extension work in the State. There has been a hearty response to the extension work thus far organized, and it is planned during the winter to hold a series of itinerant schools at the conclusion of the cotton school, the stockmen's short course, the farmers' conference, and other meetings to be held at the college in January.

Hawaii Federal Station.—Funds have been allotted from the Territorial income tax to erect a new office building for the station. It is proposed to provide in this building rooms for the library, storage of bulletins, and offices for five or six members of the staff. The old office building will then be turned over to the joint use of the chemist and entomologist, and the quarters now used by the agronomist will be used for storage purposes.

An arrangement has just been completed for starting a rotation experiment of 60 acres on the island of Molokai. This experiment is to be under the direction of the station and the work done by the owner of the land. The land will be at the disposal of the station until the experiment is concluded.

Idaho Station.—W. L. Carlyle, formerly of the Colorado College and Station, has been appointed director, and entered upon his duties January 1.

Minnesota University and Station.—A. F. Woods, assistant chief of the Bureau of Plant Industry of this Department, has been appointed dean and director to succeed J. W. Olsen, resigned, and will enter upon his duties about February 15. O. M. Olson, deputy superintendent of farmers' institutes at the Washington College, has accepted a position with the extension department of the college of agriculture.

Nebraska University and Station.—Charles S. Allen and William G. Whitmore have been reelected regents, and Frank L. Haller, of Omaha, has been elected to fill a vacancy on the board. G. Herbert Koons, adjunct professor of agricultural botany, has also been appointed assistant in agricultural botany in the station.

New Mexico College and Station.—F. L. Bixby, connected with the Irrigation Investigation of this Office, has been appointed professor of civil and irrigation engineering in the college and irrigation engineer in the station, and entered upon his duties January 1.

Ohio State University.—Owing to the increased enrollment in the regular courses in domestic science and the resulting lack of room and equipment, the home makers' short course in domestic science has been discontinued for the present year. Extension schools continuing for one week are being held in 35 counties in the State, under the appropriation made by the last legislature. O. C. Cunningham has been appointed instructor in dairying.

Oregon College.—The department of industrial pedagogy, authorized by the board of regents in January, 1908, but held in abeyance through lack of funds, was given concrete form last August when E. D. Ressler, for 7 years president of the Oregon State Normal School, was appointed professor in charge. The first semester is being devoted to instruction in the county institutes and to the general promotion of industrial education in the State. Classes will be organized in the second semester in the pedagogy of elementary agriculture, domestic science and art, and the mechanic arts. A summer school of 7 weeks will also be organized for the benefit of public school teachers who desire opportunity to fit themselves to teach the industrial subjects.

Clemson College.—President P. H. Mell retired early in January, and will reside in Atlanta, Ga. Walter M. Riggs, director of the mechanical and electrical department, has been appointed acting president.

West Virginia Station.—O. C. Beck, an 1899 graduate of Columbia University, has been appointed assistant chemist and entered upon his duties December 1.

Wisconsin University and Station.—Recent appointments include the following assistants: Miss Emily M. Bresee and J. C. Jurrjens in the feed and fertilizer inspection, J. Johnson in horticulture, J. M. Napier in agronomy, P. P. Peterson and W. W. Weir in soils, W. W. Sylvester and F. White in agricultural engineering, and W. H. Peterson in agricultural chemistry.

American Society of Animal Nutrition.—The first annual meeting of this society was held in Chicago, November 27, in connection with the International Live Stock Exposition. About 40 college and station workers were in attendance. The secretary reported an increase in the membership to 92, representing 33 States.

The presidential address by H. P. Armsby dealt with The Food Supply of the Future. Some of the principal features of this address are noted editorially.

A brief report on affiliation with other societies was made by H. J. Waters. The society voted to authorize the president and the committee on affiliation to make such arrangements toward affiliation as they saw fit.

Chairman F. B. Mumford, of the committee on methods of reporting results of feeding experiments, recommended that bulletins of the stations which report results of investigation should be issued in a series distinct from those prepared especially for the use of the practical farmer. This recommendation was concurred in by the society. Dr. N. S. Mayo related his practice when preparing bulletins of a popular nature in Cuba of submitting his manuscript to the criticism of a practical farmer, stating that in this way many valuable suggestions were obtained.

A paper was presented by H. R. Smith, of Nebraska, on How are Feeding Experiments to be of Greater Value to the Farmer, this being devoted chiefly to the discussion of meat production. The author reported recent experiments wherein he had obtained favorable results in feeding alfalfa and corn to steers. Farmers in the corn belt were advised to devote one-fourth of their land, now in grain, to the raising of alfalfa.

E. W. Morse, of this Office, made a few remarks concerning cooperation in nutrition investigations, and read two papers by Dr. F. G. Benedict, of the Carnegie Institution, and Dr. C. F. Langworthy, of this Office, on Suggestions for Experiments in Studying the Protein Requirement of Animals. The authors of these papers called attention to the discordant results of investigations on protein requirement. These were believed to be due to factors which had been overlooked but which can be taken into consideration in future experiments by having a well-matured plan. The relation of protein to carbohydrates and the influence of mineral matter were thought to be factors which hitherto had not been given sufficient consideration.

It was suggested that it would be of great advantage if a number of stations would cooperate in this work, each investigator working on the same plan, but with different animals and with different feeding stuffs. The pig was recommended as an excellent animal with which to conduct nutrition investigations, provided the technique in carrying on the work could be improved. Such experiments would also throw light on problems connected with human nutrition. Preliminary experiments with small animals were also advocated as they are much less expensive to feed and care for and the effect on inheritance of any system of feeding can be obtained much more quickly. The question of cooperative experiments was referred to the committee on experiments.

Officers were elected for the ensuing year as follows: President, H. P. Armsby; vice-president, C. F. Curtiss; secretary-treasurer, D. H. Otis; registrar of elections, J. T. Willard; committee on experiments, the president ex-officio, H. W. Mumford, J. H. Skinner, H. J. Waters, H. R. Smith, T. L. Haecker, and E. B. Forbes; committee on terminology, H J. Waters, H. W. Mumford, W. J. Kennedy, P. F. Trowbridge, and H. S. Grindley; committee on reporting results, F. B. Mumford, D. H. Otis, and H. R. Smith; and the committee on affiliation, H. J. Waters, L. C. Hall, and H. Hayward. It was voted to have the proceedings printed in full.

The next meeting will be held in Washington, D. C., in connection with that of the Association of American Agricultural Colleges and Experiment Stations.

International Live Stock Exposition.—The tenth exhibition of live stock, held in Chicago, November 27 to December 4, amply illustrated how materially the show has raised the standards of breeding, feeding, and judging during the past decade. Judged by the number and quality of the animals exhibited, the sales of pure-bred stock, and the large attendance at the meeting of the Breeders' Association held during the week, popular interest in pure-bred stock has never been so great. The entries numbered 3,908, filling all the available space, and in most classes the quality of stock was superior to that of previous years. The prizes offered aggregated $75,000. Nearly all sections of this country were represented, together with numerous exhibits from Canada and other

foreign countries, and including for the first time an exhibitor and prize winner from Argentina. The appearance of the stock in the arena was much improved by the novel expedient of dyeing the arena sawdust green, thereby improving the light and simulating outdoor conditions.

The death of the secretary-treasurer of the association, Mortimer Levering, occurred during the show. To succeed him B. H. Heide was elected secretary and H. G. Leonard treasurer.

The agricultural colleges and experiment stations fully maintained their position of leadership at the exposition, figuring largely in the prize winnings and in the list of judges. Their entries were especially strong in the fat-stock classes, and in the single bullock show they made a surprising record by winning all the championships. There was the usual large attendance of their students and teachers, 16 institutions being represented, and the Missouri University alone sending 395 men.

In the student judging contest, 7 colleges were represented, Iowa winning with a score of 4,940 out of a possible 5,000, followed by Ontario, Ohio, Kansas, Nebraska, Missouri, and Texas. The Iowa team won first on cattle and hogs, that of Missouri on horses, and that of Ohio on sheep. A comparison of the scores with those of previous years showed that 5 men exceeded the highest previous individual record, and 6 of the 7 teams the highest previous team record.

The largest number of breed entries was in the Shorthorn classes, where there were 295 entries of Shorthorns in the breeding and 48 in the fat classes. There was a special class for milking Shorthorns, 50 per cent being allowed for beef and 50 for milk production. In the Shorthorn steers the Kansas College took first prize on calves and fifth on two-year-olds, and Iowa stood second on calves. In the yearling class Minnesota took the first prize, Ohio the fourth. In the Shorthorn association special, Kansas stood first and Iowa second in the senior calves class, and Missouri won two prizes in the junior calves.

The Angus breed ranked next to the Shorthorn in the number of entries and captured the single steer championship, the reserve championship, the champion herd, and the champion group the get of one sire, and also won 7 out of the 10 prizes offered in the dressed carcass contest. The Galloway types exhibited indicated that much improvement has been made in their quality as a beef breed since their first introduction to this country, and 2 prizes in the slaughter test went to this breed. The Polled Durham entries showed an increase to 52, and the Red Polls were also represented in greater numbers than ever before.

In the fat-stock classes there were a large number of exceptionally good steers. The Kansas College won the grand championship with a pure-bred two-year-old Angus steer, King Ellsworth, bred in Illinois and exhibited last year at the show when he weighed 1,400 lbs. He was purchased a year ago by the college and fed a ration of corn, bran, oil meal, and alfalfa hay, increasing his weight to 1,750 lbs. The reserve champion was also owned by the Kansas College. In the Angus steer contest, Kansas won first on two-year-olds, with Minnesota second, Ohio third, Nebraska fourth, and Purdue fifth, and also first and fifth on yearlings, with Nebraska second, Iowa third, and Minnesota fourth. On calves Minnesota was first, Nebraska second, and Kansas third, the last named also taking the breed championship and that for a pen of three. The colleges also took a large number of prizes in the Galloway steer classes, and in the Polled Durhams Iowa won first in yearlings, calves, and herd, and second in two-year-olds.

The grades and crosses were judged from butchers' standards by the championship judge, William Heap, of Manchester, England. The standing of the colleges in these classes was also noteworthy. On two-year-olds Iowa won sec-

ond and fourth, Missouri third; senior yearlings, Nebraska first; junior yearlings, Iowa first and third, Ohio fifth; senior calves, Missouri first, Purdue fifth; junior calves, Iowa third and fourth; pen of three, Iowa second and third, Missouri fourth; pen of three, get of one sire, Kansas first, Iowa second.

The value of the car-lot exhibit was much increased by the feeding data which were available. The Shorthorns won the championship in both the fat and feeding cattle classes and for the first time the champion load, these being yearlings weighing 1,190 lbs., and selling for $15 per hundredweight. This lot was wintered on a ration of corn on the cob with some bran, a little oil cake, and roughage consisting of clover, alfalfa, and timothy. They were carried through the summer in a 20-acre feed lot, with oil cake as a supplementary feed. Cotton-seed meal was tried at one time, but as it was not relished a return to oil cake was made. Six weeks before the show brown sugar was fed, each steer being allowed 1 lb. daily, and 4 weeks prior to shipping they were given a daily ration of oats. The prize car lot of 15 short-fed yearlings were Angus, which made a gain of 5,025 lbs. at a cost of $9.59 per hundredweight. The feed consumed in addition to pasture was stated to have been 360 bu. old corn, 450 bu. new corn, 75 bu. crushed oats, 1 ton oil meal, and 6 tons clover hay. The premium car lot of two-year-olds were Herefords which gained 4,900 lbs. at a cost of $9.30 per hundredweight. In addition to pasture they consumed 3,785 lbs. snapped corn, 4,599 lbs. corn-and-cob meal, 2,095 lbs. linseed meal, and 3,335 lbs. alfalfa hay. The prize winners in the car-lot feeding cattle were mostly from Colorado.

In the cattle slaughter test 7 out of 10 prizes went to the Angus breed, 2 to the Galloway, and 1 to the Red Polled. The first prize in the class for animals one year old and under two was won by the University of Nebraska on a grade Angus with a live weight of 1,390 lbs., dressing 65.8 per cent, and selling for 14.25 cents per pound. The first and second prizes for animals two years old and under three were also won by the University of Nebraska, and other prizes in this contest were won by the Iowa College and the Ohio State University.

The display in the fat classes of sheep was of high character and showed a growing interest in mutton sheep in the corn belt. Many prizes were won by the Wisconsin, Wyoming, and Ohio universities. In the dressed carcass contest all the prizes were won by the Wisconsin University except the second prize, which went to the Iowa College. The Southdown was the only breed represented in this test. The first prize yearling dressed 63.48 per cent of the live weight and sold for 10.25 cts. per pound. The first prize lamb dressed 60.64 per cent live weight and sold for 51 cts. per pound. A notable feature of this contest was the uniformity in rating on foot and on the block, the lambs that won first and second in the carcass test having won first and second in the open classes for Southdown lambs. The Wyoming University showed a novelty in a Highland-Cotswold cross. This was cut for inspection, as were the best 5 sheep in both yearling and lamb classes. The forequarter proved to be too heavy, and the percentage of fat to lean far too excessive. The pea-fed lot of yearlings submitted by the Wisconsin University won first as in the past 2 years.

After an interval of several years the breeding classes for swine were reestablished this year. Prizes were obtained by the Iowa College and the Ohio State and Purdue universities. In the dressed swine contest the prize went to a Poland China, which dressed 87.42 per cent, the Iowa College winning third on a Duroc Jersey that dressed 86.27 per cent. The Ohio State University had the only exhibit of fat Large Yorkshires, and showed 3 barrows of the curly coated Lincolnshire breed—the first brought to this country. Two of these were slaughtered and dressed 77.8 and 77.11 per cent respectively. The Iowa Station showed a number of pens of swine that had been used in experimental work which illustrated the effect of feeding different rations.

In the special classes for college and station stock, Kansas won first on two-year-olds, followed by Iowa, Missouri, and Ohio; and also first on yearlings, with Nebraska second, Iowa third, and Minnesota fourth. On calves Missouri won first and third, with Kansas second, and Iowa fourth; and the championship for a single animal and a pen of five went to Kansas.

Local Short Courses for Farmers and Teachers in Tennessee.—*The Nashville Banner* of November 27 states that the State Commissioner of Agriculture in Tennessee has inaugurated a system of itinerant short courses for farmers and public school teachers and officers. It is expected that the instruction given will enable teachers to give elementary instruction in agriculture in their own schools.

European Horticultural Departments.—According to *The Gardeners' Chronicle*, an enactment signed by the King of Belgium, November 9, establishes a special department of horticulture in that country. The councilors in whose hands the work of organizing the department has been placed are Messrs. E. de Meyer, E. Henrionille, and L. Joosens. This is believed to be the first definite department devoted exclusively to the interests of horticulture ever organized.

By a legal enactment taking effect September 9, a technical commission of horticulture was organized in the French ministry of agriculture. This commission is to be composed partly of members ex-officio, including leading officials in the ministry of agriculture and other administrative departments of the government, as well as the president of the National Horticultural Society of France and the director of the National Horticultural School of Versailles, and partly of members to be appointed by the minister of agriculture. It is to meet subject to the call of the minister of agriculture and pass upon all questions submitted to it for examination.

Miscellaneous.—At the recent Dry Farming Congress at Billings, Mont., a resolution was adopted urging "that a Weather Bureau expert be detailed to each experiment station for the purpose of investigating soil moisture and tillage, in order that records may be obtained by which precipitation and evaporation may be determined."

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Dr. Albin Braf, royal imperial minister of agriculture of Austria, has resigned to become royal imperial privy counsellor, and has been succeeded by Dr. Josef Ritter v. Popp, section chief in the ministry of agriculture.

W. Bateson, professor of biology at the University of Cambridge, has accepted the position of director of the newly established John Innes Horticultural Institution.

EXPERIMENT STATION RECORD.

Editor: E. W. ALLEN, Ph. D., *Assistant Director.*
Assistant Editor: H. L. Knight.

EDITORIAL DEPARTMENTS.

Agricultural Chemistry and Agrotechny—L. W. Fetzer, Ph. D.
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Agricultural Botany and Vegetable Pathology—W. H. Evans, Ph. D.
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Economic Zoology, Entomology, and Veterinary Medicine—W. A. Hooker.
Rural Engineering———— ———.
Rural Economics—J. B. Morman.
Agricultural Education—D. J. Crosby.

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SUBJECT LIST OF ABSTRACTS.

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AGRICULTURAL BOTANY.

FIELD CROPS.

HORTICULTURE.

FORESTRY.

DISEASES OF PLANTS.

FOODS—HUMAN NUTRITION.

ANIMAL PRODUCTION.

LIST OF EXPERIMENT STATION AND DEPARTMENT PUBLICATIONS REVIEWED.

NOTE.—The publications of the United States Department of Agriculture may be purchased from the Superintendent of Documents, Washington, D. C., to whom all remittances should be made. The price of *Experiment Station Record* is $1 per volume, and there will be two volumes each year. The prices of other technical publications are given above. The publications of the State experiment stations are distributed from the stations and not from the Department.

EXPERIMENT STATION RECORD.

VOL. XXII. FEBRUARY, 1910. No. 2.

The distinction between government and administration in the management of educational institutions is not always as sharply drawn or as carefully observed as it should be. There is frequent confusion in the minds of governing boards as to their duties and those of the president of the college and other officers; and this confusion leads to an assumption of the duties of the executive by the board, which the latter is not fitted by training or experience to discharge. The result is detrimental to good organization and efficient administration, and leads to no end of internal difficulty. In a broad way it retards the development of the proper spirit and the conception of an institution for higher learning.

This difficulty is by no means new in our agricultural colleges and experiment stations. There has been reason to expect, however, that it would pass away as the institutions grew in years and in experience and the example of the whole system became crystallized into a method of procedure. While this has been the case quite generally, there continue to be evidences of the evils which result from an improper attitude and a false conception on the part of persons selected to govern these institutions. The matter is so vital to the progress and welfare of the colleges and stations, and to their general standing in the educational world, that it seems worthy of consideration.

As state institutions the agricultural colleges and experiment stations stand in unusually close relation to the public. In many ways besides through their appropriations they feel the pulse of the people, and their proper development depends upon an enlightened public opinion. Being creatures of the State, they are often regarded as subjects for special control and direction from a variety of sources, in order that they shall carry out the will and the ideas of the people in all matters. The necessity for a broad and consistent policy and a just conception of the position and requirements of such institutions is not always fully realized by the public, and the recognition of these matters depends in a general way upon the education of the people of the whole State.

The people's part in the government of educational institutions is exercised through the governing boards, sometimes elected by popular vote, and more often appointed by the governor. It is on the assump-

tion that such boards will serve as the governing body of the institution, lending stability and continuity to it, guiding its development, and standing between it and the people, that the appointment of a board of trustees rests. On no other assumption as to their function are boards needed, for the institution must of necessity have executive officers to whom the details of administration are in all propriety committed, and these officers might be made directly responsible to state officials for the use of funds and the carrying out of the laws enacted by the people. Freedom and latitude must be accorded the administrative officer if efficient and progressive work is to be done.

Upon the attitude of the men comprising the board and their conception, not only of the institution but of their own functions as officers, depends in a very vital way the usefulness of the board as a whole to the institution. Members sometimes feel that as they are the trustees of the people it is their duty to see that the public's ideas are being carried out, not only in effect, but at all stages in the working out of the details. Their office is assumed to carry large responsibilities of directorship and administration, and this leads members to undertake duties for which expert officers are necessary and have been provided. Their efforts at control in detail are usually spasmodic for lack of time, as they are further inefficient from lack of expert knowledge. They lead the board into an impossible position, resulting in ill-considered action and often in injuries to the institution and to individuals.

These are not theoretical considerations but are based on actual experience. They indicate that a sharper distinction between the duties of government on the one hand and of administration on the other is very desirable from every point of view.

The real function of the board of trustees or regents is to govern the institution, to determine its general policy and to select a president to whom the administration of its affairs is committed. It will have discharged its highest function when it has selected an administrative officer, appointed a corps of workers, and made arrangements by which these men can render the best possible service of which they are capable.

In carrying out this function the board will naturally appoint officers, on the nomination of the president, fix salaries, approve the plans of work and the budget of expenditures, and audit the accounts. It should also provide means, pecuniary and physical, for meeting the needs of the institution; and it may investigate complaints of administration which come to it in an official way. In the interest of good administration it is its duty to support and sustain the president in carrying out the approved policy of action, as long as he is retained

in that office; and it should at all times stand firmly behind the institution, defending it against unfair or captious criticism and the interference of political or other influences not worthy to be considered in the management of an educational or scientific institution.

In this field lies its greatest usefulness. If it discharges these duties it will have given strength and dignity to the administration, and done all that can be wisely expected of it. When a board as a whole, or through committees, goes beyond this and undertakes to run the institution in detail, it oversteps the bounds of its official province, and trouble always results.

This view of the board's functions, while accepted at some institutions, is radically departed from at others, usually with the best of intentions, but nevertheless to the embarrassment of the head of the institution. Instead of adding to their efficiency and the economy of the funds, it constitutes one of the present weaknesses of such institutions. Boards often feel, for example, that as the personnel of the college is one of the most important factors in its development, its selection should be one of their chief functions; and they are not always mindful of the difficulties, mistakes, and injustice which such a course entails. In the case of dismissals they do not appreciate how serious a blow may be struck to academic integrity and to the dignity of the teacher's position, as well as to the good name of the institution.

The selection of the heads of the various departments requires an expert executive, familiar with the requirements of the positions and fitted by association and experience to pass upon the academic qualifications of men. It is for such duties that the board of regents chooses a president, and upon his fitness and judgment in selecting and attracting strong men to the institution will the strength of its various departments in large measure depend. Ability in this direction has been described as the highest quality of the trained college executive. To sustain him in attaining this ideal is one of the highest functions of the board of regents.

In other cases, the trustees have themselves undertaken to prescribe and revise courses of study, regardless of the teaching force, and have insisted upon the elimination of branches which did not appear to them to be practical. Such action is not only unwise on general principles, but it leads to the grave danger of making the courses too specialized and of overlooking the fact that these colleges are for education as well as for manual training. The grade and general scope of an institution can be indicated without taking the curriculum out of the hands of the experts employed to devise and arrange it with reference to the attainment of desired ends.

Cases have arisen in which administration by committees of the board has been carried to such an extent as largely to rob the presi-

dent of authority and power in carying out the general policy of the institution, and to place him in an undignified position before his faculty and the people of his State. Such practice is the end of organization and esprit de corps, for it leads every man to work for himself with his particular committee, and leaves no agency to preserve the symmetry and integrity of the institution. Good administration is impossible, for responsibility is divided and a common purpose in working out a general plan is lacking.

One college president has recently resigned because of the presistent attempts of the board to manage the college by committees which took upon themselves administrative duties, and because of the insistence of members in placing their friends and relatives on the faculty of the institution. In this college there were ten such people out of a total of about forty. Aside from being an improper infringement on the president's functions, such practice is manifestly unfair to him, for in the end he is held for results and is looked upon to secure efficiency, maintain academic standards and spirit in the institution, and promote a feeling of loyalty and of security among the members of his faculty. His reputation as a college executive is at stake, and the reasons for his lack of success can not be generally explained.

An instance in which personal strife within the board has been allowed to go so far as to seriously interfere with the work of an institution may also be cited. A board election for treasurership was contested by one of the members, carried to the courts, where the records of the board were reversed, and the case appealed to the highest state tribunal, where it at present awaits action. Meanwhile the college and station are deprived of the use of their funds, resulting in serious embarrassment in the conduct of the institutions, which increases as the delay is prolonged. Here the welfare of the institution which the board was appointed to protect and to promote is sacrificed in the contest for a small personal advantage, in which the institution has no interest and apparently nothing to gain.

The same distinctions between the functions of the governing board and the executive apply with equal or perhaps greater force in the management of the experiment station. The station usually bears a much more direct relation to the board than other departments of the college do. While it is a department of the institution, it usually has a quite distinct autonomy, and is presided over by a special administrative officer. His duties and responsibilities in relation to the station work are analogous to those of the president to the institution as a whole.

Because of this separateness of the station and the special character of its work, it has been customary to assign it to a committee

of the trustees or a board of control. Such bodies may be very helpful to the station, acting in much the same way that the full board does for the whole institution; but misdirected and undue activity on their part may be even more harmful than in the case of the college, and seriously handicaps its workers.

The first action of the board of control should be to appoint a director who by training and other qualifications is competent to have intrusted to him the scientific activity, the business, and the general management of the station. He is to be the administrative officer of the station, in charge of the persons on its staff, its work as a whole, and its general business. He is the keynote of the organization. In the final analysis he will be held largely responsible for the success of the station, and if he is given support and opportunity the making of the station will be largely in his hands. His position is therefore a responsible and important one, and requires for success a many-sided ability, as it does a just recognition of the functions of his office.

The director must be first of all a man of scientific training, having judgment and sympathy in regard to investigation for agriculture in a broad way. To this he should add experience in experiment station work and familiarity with its field. Such a man is indispensable to the upbuilding and maintenance of a strong corps of workers and the intelligent development of their work. The time has passed when the administration of a station can properly be assigned to a farmer or any other business man, however competent and progressive he may be along agricultural lines. Agricultural investigation and experiment is a work for experts, and the general direction of such persons requires a man of broad training in science, able to appreciate the work of the specialists, to guide it in profitable channels, and to encourage and stimulate the investigators to their best efforts.

The successful director must also be a man of executive ability. This applies not only to the investigation work but to the business side of the station. He must be able to so organize the affairs of the station that they will move smoothly and in a businesslike manner; and while giving large freedom and responsibility to members of the staff, he must consider the lines of work which are to be taken up and keep in touch with the progress in the various departments. All persons connected with the station should be responsible to him as far as their station work is concerned, and the board and the president of the college should deal with them on station matters through the director. There can not be a divided responsibility in this matter, and there can be no efficient administration when the men are subjected to direction from members of the board or are encouraged to go around the director in seeking support from the board.

Like the president of the college, the director must be a good judge of men needed to carry on the station's work, and his judgment must be largely relied upon in matters pertaining to the staff. For the board to remove competent men against his advice, or to force upon him men who are evidently incompetent or unsuited, is unjust to him and to the men of his staff, for it degrades the positions and is reflected in a lessened efficiency for which the director is not responsible.

The position of the director requires that he should be given large latitude and freedom in carrying out the general policy of work and expenditures which has been approved by the board. It is worse than useless for the board itself to attempt to deal with matters in detail; and it is unjust to the director, with the responsibilities which his position carries, to hamper him by undue restrictions, or through his relations with the college as a whole, the farm, or otherwise. And the scope of his responsibility should rarely be broadened to include the management of the college farm or the college forest, or other functions which have no particular relation to the station's activities. With the rapid growth of the stations in appropriations, variety of work, and demands upon it, the director who follows matters up as he should has plenty to do, and if he has any spare time he may better devote it to some investigations of his own rather than assume additional duties which may endanger the success of his administration.

The practical character of the station has made it especially subject to undue interference in matters of detail. This grows out of a failure to realize the actual function of the board, a false conception of what is implied in the "control" of the station, and a lack of appreciation of the requirements of scientific work. It implies a feeling that the specialists employed to administer and conduct the station's operations are not practical in business affairs and often in their work, and need supervision of a kind which the director can not be relied upon to give them. Although prompted by the kindliest motives, it may become humiliating to men of science, and in effect be a restriction of academic freedom to which their work entitles them. It has often made positions in the stations seem undesirable and unattractive to men trained in the more liberal institutions.

In some instances members of the board have, with the best of intentions, undertaken to direct the work in certain lines, contrary to the judgment of the station officers. Being practical men and keenly interested in the station's work, they have felt that their position warranted their interference in minor details, or the imposition of resrictions and limitations. The attempt to carry out undertakings that were insisted upon by the board has more than once resulted in misuse of the federal funds, which has had to be adjusted later at

considerable inconvenience; and the attitude of directors in resisting such attempts has resulted in complications of a serious character, sometimes leading up to removal.

In some cases all travel is forbidden members of the staff, thus detracting from the accuracy and efficiency of their work. Rules are imposed providing that the work shall not entail any actual expense, or endanger the good appearance of the herd, or interfere with certain plans or operations on the farm. In other instances all requisitions are required to be signed by a committee of the board before purchases can be made, entailing annoyance and delay, and implying a lack of confidence in the administrative officer. Again members of the board have arrogated to themselves the purchase of certain live stock and supplies, the superintendence of building operations, the management of branch stations, the control of labor, and similar matters pertaining directly to the station's work. In one specific case a member of the board was detailed to take personal charge of the outdoor work in spring, to see that the seed was properly put in, and other details of experimental work carried out in accordance with his ideas.

While these things in themselves rarely affect the station work in a very serious way, they are petty and annoying, and detract from the dignity of positions in the stations. They indicate a wrong attitude and idea of duty, which sooner or later make trouble. Such activities can not be said to be of any real advantage to the station, and they prevent it from getting and retaining high class experts in the work.

The planning and conduct of the work of an experiment station should be left to its expert officers. The best trained men possible should be secured, and then they should be given ample facilities and time, and left to work in accordance with scientific methods and principles. It should always be kept in mind that an experiment station is primarily a scientific institution; that its purpose is to bring science to the aid of agricultural practice; but that it must be allowed to work this out in its own way.

While the necessity for security and permanency in the staff is more generally recognized than formerly, there have recently been several instances of violation of this principle of justice and efficiency, and of unwise activity on the part of the board in relation to the station staff. In one case the director and several members of the staff were dismissed without notice, and positions on the staff were filled by the board without the assistance of a director in selecting the men. The board itself was obviously not competent to choose men for such positions. The result was that in less than a year several of the new men were dismissed; and in continuation of the former policy the

resignations of other old employees were called for. No station could escape the effects of such a course. Its work is materially set back, and the station is given an undesirable reputation among men available for filling such positions.

In another case a conscientious and successful director was forced to resign by the attitude of his superiors, and because this was generally resented by the staff as being an injustice and a blow at faithful service, other dismissals followed. Such a course will inevitably cripple the station for years to come, and will interrupt lines of investigation which have been in progress for some time. The morale of the whole institution is affected, as well as its standing among scientific institutions.

Quite recently the director of a station has been forced to resign under conditions which are especially disconcerting. He was obviously a man of the type needed in station management to-day, with good scientific training, considerable experience in station work, business ability, active and energetic, and sympathetic toward agriculture and its needs in the State. In the short time he had been director he had brought about decided improvement in the organization, business, and work of the station, and in its relations to the agricultural interests of the State. For the first time the station had had an existence as an entity, with a solidarity and a spirit among its staff which were already counting for much. To the outsider the station seemed to be well administered and on the road to a far greater usefulness than ever before. The president strongly indorsed the management of the station and recommended the director for his zeal and ability. The board had reelected him at its annual meeting some months previous.

In view of all these facts, the summary dismissal of this man in the middle of the year came as a great surprise to those familiar with the general conditions, and this surprise was not dispelled by the character of the charges formulated. No important definite criticism of his management of the station was brought forward, but it became evident that the real difficulty lay in his personal relations with individual members of the board who had attempted to take the station management into their own hands. The surprising thing is that the personal equation should have so far overshadowed the generally good condition of the station with the board as a whole, as to permit of his dismissal against the recommendation of the president and other advisers.

It is this which gives the case its broader interest, for no station can exist unto itself, and confidence in the stability of station positions based on competent service was rudely shaken. That so important a position as that of director should be subject to personal prejudice, regardless of the general condition and welfare of the sta-

tion, makes it clear that we have much to gain in the recognition of principles of good government as applied to these institutions. It is an indication of an attitude which is dangerous, and which unless curbed by public sentiment or by changes in the kind of men appointed on such boards is sure to make trouble for any director.

The director must be able to get on with the board as a whole, and must satisfy it of his ability to administer the station affairs in a competent and sympathetic manner. He must be judged by the general results, in a broad way. To subject him to the dictation of individual members of the board between meetings places him, or any member of the staff, in an impossible position. The station work can not be efficiently administered on such a basis.

No two men would ever run a station in the same way, and there is always abundant material for criticism in detail. Criticism may be helpful if sympathetic, and suggestions of lines of work or of features of investigation should be welcomed and given respectful consideration at all times. But an attempt to force the station into an undertaking which is not properly within its field, in order to serve the purposes of individual members of the board, suggests the need of reform in the attitude of the board, rather than a change in the type of man for director.

Membership on the board is a position of trust, and implies a duty, not merely an honor. It is a compliment in the sense that it expresses the confidence of the people. The honor will depend on the attitude of the board as a whole, and upon the manner in which the duties properly belonging to it are discharged. Such a position is an opportunity to serve the people in one of the highest capacities, for the wise development of its educational and research institutions is one of the highest services which can be rendered. It is not to be taken lightly.

The discharge of this trust calls for breadth of view, an open mind, and freedom from personal or political bias or narrow considerations of personal advantage. It calls for the exercise of a proper perspective in dealing with matters, and a just sense of proportion. Mistakes and errors of judgment are made at all institutions, but the relative importance of these when considered in their broad relations to the activities of the institution as a whole determines their seriousness. A man like an institution is not to be judged by his mistakes alone, but by what he accomplishes.

We have many excellent men on the governing boards of the agricultural colleges and experiment stations, men who are actuated by the highest motives of patriotic and conscientious service, and who understand well the directions in which their services will be most useful. The time is also passing happily when politics often interrupt the continuity of the board, or seriously influence its action

with reference to the personnel of the station. But there is still need, in some cases, of a higher standard for the composition of these boards, based on the service which will be required of their members and their great importance in the proper development of these institutions.

In some cases the state laws and even the state constiutions have placed undue limitations on the kind of men to be appointed to the board, and have thus robbed it of a breadth of representation which is very desirable. In some cases only men engaged in farming are eligible to appointment, and there is no provision for an officer having familiarity or connection with educational work. It not infrequently happens that a majority of the members are not college graduates and are without previous opportunity for coming into touch with the traditions and practices of such institutions.

The restriction of the duties of the board to those of the general government of the institution in no sense detracts from the importance of that body, or the necessity for selecting men carefully for it. The fact that it deals with matters in a large way and looks to experts of its own appointing for advice and for the carrying out of details, makes its action none the less fundamental. The weight of its influence in giving continuity and in maintaining proper public sentiment and in securing appropriations for the institution's work gives it a place of first importance.

A high sense of the obligation which membership in the governing board implies is equally as essential as a definition of function. Appointments are often too lightly made and accepted, and as they do not carry monetary consideration are greatly underestimated in importance or in the duty they imply. Acceptance of a trusteeship implies an agreement with the people to give the best of a man's ability, and to devote the time necessary to attending meetings and discharging intelligently the duties of membership. A neutral or passive attitude, or failure to attend regular meetings, deprives the public of an active and aggressive representative. It is a failure to recognize a public duty which has been voluntarily assumed.

The appointment of competent, broad-minded, public-spirited persons on the boards of these institutions is of very great importance, and is worthy of far greater public interest than it usually receives. It is fundamental, because such boards have it in their power to largely determine the course of development of these institutions and their standing in the educational system. No executive officer should be obliged to spend his energy in attempting to manage his board. The appointment of men having the necessary qualifications may well receive the active attention of bodies and organizations which have the welfare of these institutions at heart, and are seeking to promote their progress.

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

The so-called nitrogen-free extract substances in foods and feeding stuffs, J. König and W. Sutthoff (*Landw. Vers. Stat., 70 (1909), No. 5–6, pp. 343–403*).—This article deals chiefly with a study of those bodies which are generally included under the term "nonnitrogenous extractive matter" minus the true carbohydrates.

In connection with this work studies were made of the various starch determination methods with a view to obtaining one which dissolves the least possible amount of substances other than starch during the process. It was found that the Mayrhofer direct method yielded the best results although it can not be employed in all cases because in some instances it yields a cloudy and unfilterable solution. Next to this are preferred the inversion steam pressure and the acid inversion methods, but in both of these deductions must be made for the pentoses produced during the process. The Lintner method (polarimetric) yields good results even with substances having a low starch content. The chief difficulty lies, with all these methods, in the different conceptions which workers have in calculating the starch content.

Among the thus far undetermined constituents of the "nonnitrogenous extractive matter" the author states that there are bodies with a high carbon content and which probably belong to the "lignin group." By extracting substances free from starch and soluble carbohydrates with dilute sulphuric acid, bodies were obtained which had a higher carbon content than either cellulose (44.4 per cent of carbon) or pentosan (45.5 per cent of carbon). A portion of this extract is soluble in water only under steam pressure or in König's glycerin-sulphuric acid mixture, but the portion soluble in water has a lower carbon content than that soluble in glycerin-sulphuric acid. This is slightly higher than that of the lignin in the "crude fiber."

Digestion experiments with sheep showed that the digestibility of the crude fiber carbon group is nearly always more than that of the group extracted by sulphuric acid and glycerin and considered physiologically is on a par with cellulose. The carbon content of the digested "total nitrogen-free extract" is usually higher than that of the digested nitrogen-free crude fiber, and evidently more cellulose than lignin is digested. The authors show that the analysis of fodders as conducted at present gives us no clue as to the lignin content particularly where this term is to mean bodies which contain more than 45.5 per cent of carbon. These bodies are probably present in a more condensed condition like the hemihexosans, cellulose hexosans, etc.

The authors conclude that the use of the term "carbohydrates" for foodstuffs and fodder rich in "crude fiber" is not warranted while the name "nonnitrogenous extractive matter" is confusing and imparts the belief that these bodies are easily soluble in water.

The nature of the kutin contained in crude fiber, W. Sutthoff (*Ztschr. Untersuch. Nahr. u. Genussmtl., 17 (1909), No. 11, pp. 662, 663*).—With "kutin" obtained according to König's method, the author on saponifying with a 20 per

cent potassium hydroxid solution and extracting with petroleum ether obtained a grayish-white crystalline alcoholic body which had a melting point lying between 55 and 56° C. On acidifying the soap solution an acid was also obtained, soluble in petroleum ether but which crystallized with great difficulty. More of this acid, however, was obtained than of the alcohol. The acid had a melting point of 30° C.

An elementary analysis of both substances was made and it was found that on comparing the carbon content of each with that in the total kutin the ratio of the acid to alcohol must be 10:1. The alcohol contained either 17 atoms of carbon, or a mixture of alcohols containing from 16 to 18 atoms of carbon in the molecule. The acid is a mixture of bodies, as it does not crystallize easily, and has an indefinite melting point, and further because an ester whose alcohol contains 17 atoms of carbon and its acid 10 to the molecule must contain more than an equal amount of the former. On comparing the above this was not apparent.

Determination of starch by means of trichloracetic acid, P. Biourge (*Abs. in Chem. Ztg., 33 (1909), No. 103, Repert., p. 446*).—The starch is dissolved in trichloracetic acid in a closed flask and heated for 25 minutes at 1 atmosphere. It is then filtered and the filtrate made up to a bulk of 110 to 125 cc., clarified with clay, and polarized in a 200 mm. tube. The value thus obtained agrees sufficiently well with the true results for quick analytical work. The rotation of starch is taken as 200° but if the value $\alpha D=197°$ is used, the results are much more exact. The presence of other carbohydrates interferes with the results and these must be removed with barium hydroxid and alcohol.

The sugars in asparagus, G. Tanret (*Bul. Soc. Chim. France, 4. ser., 5 (1909), No. 16–17, pp. 889–895; Compt. Rend. Acad. Sci. [Paris], 149 (1909), No. 1, pp. 48–50; abs. in Chem. Zentbl., 1909, II, No. 8, pp. 633, 634*).—The new sugars, asparagose and pseudo-asparagose, were isolated from the root and green berries. They were not found to occur in the young sprouts or in the ripe fruits, in both of which only reducing sugar occurs.

The occurrence of pinene in lemon oil, E. M. Chace (*U. S. Dept. Agr., Bur. Chem. Circ. 46, pp. 24, figs. 2*).—As the result of extensive investigations carried on in Sicily as to the manufacture of lemon oil, it is stated that the contention of the Bureau of Chemistry of this Department that certain Sicilian lemon oils were adulterated, either by the addition of turpentine or by some manipulation in the method of manufacture, is substantiated.

The circular contains a discussion of methods of analysis and reports the results obtained in the examination of a number of samples of lemon oils.

According to the author, the only reasonable conclusion from his investigation "would seem to be that where pinene is found in lemon oil, using only ordinary means of distillation, it is prima facie proof of adulteration, whether or not the physical constants of the oil are abnormal."

Determination of sodium benzoate in ketchups, W. E. Hillyer (*Jour. Indus. and Engin. Chem., 1 (1909), No. 8, pp. 538–540*).—This method is based on the differences in solubility of silver benzoate and silver nitrate in ethyl alcohol.

Carbonophosphates in milk, A. Barillé (*Compt. Rend. Acad. Sci. [Paris], 149 (1909), No. 5, pp. 356–358; abs. in Jour. Soc. Chem. Indus., 28 (1909), No. 17, p. 957*).—The author assumes the presence of carbonophosphates proved by the fact that calcium carbonate and dicalcium phosphate are precipitated when milk is heated at 50° C. for 24 hours. Carbon dioxid is also liberated at this temperature and is probably produced by the decomposition of the carbonophosphates.

A volumetric method for the determination of casein in milk, L. L. Van Slyke and A. W. Bosworth (*New York State Sta. Tech. Bul. 10, pp. 231–249,*

pl. 1).—The Matthaiopoulos method (E. S. R., 20, p. 705) has been modified and simplified in so far that the results may be obtained more rapidly and are more accurate.

The method consists of diluting 17.5 cc. of milk with about 80 cc. of distilled water in a 200 cc. flask. The milk is then neutralized with sodium hydrate until a pink color is obtained with phenolphthalein. (The authors find it advantageous to use a specially prepared color standard for this purpose.) The casein is then precipitated at 65 to 75° F. with a standard acetic acid solution (79.5 cc. normal solution diluted to 1,000 cc.), adding this in 5 cc. amounts, and agitating after each addition. When 25 cc. have been added the casein is examined as to its flocculence and as to whether the fluid above it is comparatively clear. If this is not so 1 cc. more of acid is added and the process is continued until the desired result is obtained. The number of cubic centimeters of acetic acid solution used is recorded as (A). The flask is then filled up to the 200 cc. mark with distilled water, well shaken, and filtered through a dry filter into a dry beaker. The filtrate must be clear. Then 100 cc. of filtrate is pipetted off and titrated with a standard alkali solution (79.5 cc. normal solution hydroxid diluted to 1 liter) until a pink tint constant toward phenolphthalein is obtained. The number of cubic centimeters of alkali used is recorded as (B). The calculation is $\frac{A}{2}-B=$ Percentage of casein in the milk.

A rapid method of determining the percentage of casein in milk, T. B. Robertson (*Jour. Indus. and Engin. Chem., 1 (1909), No. 10, pp. 723–725*).—The method consists of precipitating 50 cc. of diluted milk with 75 cc. of tenth-normal acetic acid, filtering off the precipitate, and washing it with distilled water. After the precipitate is allowed to drain for 1 hour, it is taken, together with the filter paper, and macerated with decinormal sodium hydroxid solution until all the casein is dissolved. The solution is then filtered and the refractive index of the filtrate determined with the Pulfrich refractometer. The readings are taken within 1 minute of the angle of total reflection at 20° C.

The calculation is made by taking the refractive index of decinormal sodium hydroxid as 1.33444, when the number of grams of casein in 50 cc. milk equals $\frac{n-1.33444}{0.00152}$, where n is the refractive index of the final solution as obtained above.

The influence of cold on constants of fat, H. Wagner and P. Bohrisch (*Ztschr. Untersuch. Nahr. u. Genussmtl., 18 (1909), No. 6, pp. 366, 367*).—Samples of lard, oleomargarine, mutton tallow, and artificial food fat were exposed to temperatures of —7 to —10° C. It was found that practically no changes were apparent in the chemical constants save a change in the iodin number. The melting and solidifying points changed slightly.

The influence of preservatives on the Reichert-Meissl number, C. Grimaldi (*Chem. Ztg., 32 (1908), No. 67, p. 794; abs. in Ztschr. Untersuch. Nahr. u. Genussmtl., 18 (1909), No. 6, pp. 381, 382*).—The presence of benzoic acid in butter, oleomargarine, and coco fat increases the Reichert-Meissl number slightly, the increase being proportional to the amount present. Salicylic acid increases the Reichert-Meissl number in oleomargarine and coco fat, but less so than benzoic acid, and decreases it in cow butter if the amount present is over 0.5 per cent.

The refraction of butter fat, margarin, lard, cocoa butter, and coco fat, H. Matthes and F. Streitberger (*Pharm. Zentralhalle, 49 (1908), No. 7, pp. 119–121; abs. in Ztschr. Untersuch. Nahr. u. Genussmtl., 18 (1909), No. 6, p. 380*).—The differences between the refraction of the fat and the nonvolatile fatty acids are for butter 11.2 to 11.5, margarin 13.2 to 13.7, coco fat 16.1 to

16.5, lard 13.2 to 14.5, and cocoa butter 12.4 to 12.7. Judging from these figures, Hoton's suggestion to detect adulteration in this manner does not seem feasible.

The value of the silver number for butter fat, H. MATTHES and F. STREITBERGER (*Pharm. Zentralhalle, 49 (1908), No. 5, pp. 81, 82; abs. in Ztschr. Untersuch. Nahr. u. Genussmtl., 18 (1909), No. 6, p. 381*).—On the basis of a large number of analyses the authors declare the silver number to be of limited value in testing for the purity of butter fat.

The determination of fat in cheese by the Babcock test, J. L. SAMMIS (*Jour. Indus. and Engin. Chem., 1 (1909), No. 8, p. 604*).—This is a method for hastening the execution of the test, in which 8 to 10 gm. of cheese are weighed into a Babcock cream bottle, 10 cc. of water at 65 to 70° C. added, and upon this 17.6 cc. of sulphuric acid, 1 cc. of the acid being added at a time at the beginning of the operation, with mixing and shaking after each addition.

A modified Kjeldahl connecting bulb, C. A. JENNINGS (*Jour. Indus. and Engin. Chem., 1 (1909), No. 10, pp. 737, 738, fig. 1*).—This consists of the ordinary bulb with an external opening in the bulb and a neck continuous with the same. The object is to eliminate the necessity of disconnecting the tube from the bottle when fluids are to be brought into the flask.

Report of the provincial laboratory at Roulers, J. VAN DEN BERGHE (*Lab. Prov. Roulers Rap. 1908, pp. 18*).—A report of the work of this laboratory during 1908.

Report of the work in milk chemistry and dairying for the first half of the year 1909, GRIMMER (*Milchw. Zentbl., 5 (1909), No. 9, pp. 377–393*).—This summarizes most of the important work in these fields.

Biochemical studies of the slime producing lactic acid bacteria, R. BURRI and O. ALLEMANN (*Ztschr. Untersuch. Nahr. u. Genussmtl., 18 (1909), No. 8, pp. 449–461*).—The authors produced the slime substance by symbiotic cultivation, that is, mycoderma with either *B. casei* ε or *B. casei* δ in specially prepared whey media. They conclude that the body is a kind of galactose mucoid combination and that it is closely related in composition to the bacterial and higher fungi membranes. Its composition also shows a resemblance to chitin.

The hydrolysis of salicin by the enzym emulsin, C. S. HUDSON and H. S. PAINE (*U. S. Dept. Agr., Bur. Chem. Circ. 47, pp. 8, figs. 2*).—The object of this investigation was to obtain an accurate polariscopic method for measuring the range of activity of the enzym emulsin.

The authors find that the glucose produced by emulsin from salicin has a rotation of 15 to 25°. This agrees with the known rotation of β-glucose (20°), but not with that of α-glucose, the rotation of which is 110°. This indicates that in all probability the glucose is the β-kind. Further, it is shown that a secondary reaction occurs in which the mutarotation affects the polariscopic readings of the salicin solutions during the hydrolysis by emulsin. This is considered the source of error in the measurements of Henri, who assumed that the hydrolysis of salicin did not occur in the unimolecular order. The real rate at 0° and 30° C. of hydrolysis of salicin by emulsin was measured by checking the enzym action during the intermediate stages with sodium carbonate and before taking the polariscopic readings. The rate was found to follow the unimolecular order. Emulsin is active in only a very small region of acidity and alkalinity near the neutral point.

Racemic glutaminic acid during putrefaction, C. NEUBERG (*Biochem. Ztschr., 18 (1909), No. 3–5, pp. 431–434; abs. in Chem. Zentbl., 1909, II, No. 7, p. 512*).—Racemic glutaminic acid is not changed to the optically active form by the various excitors of putrefaction. In this way it does not differ markedly from the decomposition of the natural right-handed rotary acids.

The chemical composition and biological rôle of an oxydase, H. EULER and I. BOLIN (*Ztschr. Phys. Chem., 69 (1909), pp. 187–202, figs. 2*).—Laccase was prepared from *Medicago sativa* and was found to be chiefly composed of neutral calcium combinations with a 1, 2, and 3 basic oxyacid. The acids found were citric, succinic, mesoxalic, and glycollic, with traces of glyoxylic. Plants containing manganese accelerate the oxidizing action of laccase toward polyphenol and its derivatives, particularly where the media is either acid, alkaline, or neutral. In such instances the laccase plays a definite biological rôle in the oxidizing processes of the plant. Laccase can not oxidize fats and sugar directly, this being done by the various fermenting enzyms. In view of its resistance to heat, it should, according to the author, be classed with the catalyses and not with the enzyms proper.

The influence of copper salts upon alcoholic fermentation, CLARA SEISS (*Ber. K. Lehranst. Wein, Obst u. Gartenbau Geisenheim, 1908, pp. 170–175, charts 4*).—This is a study of the effects of copper sulphate on the fermentations produced by *Saccharomyces ellipsoideus* and *S. apiculatus*. The concentrations of copper sulphate were 25, 50, 100, and 200 mg. per liter of must, respectively. Twenty-five mg. per liter was found to produce a slight retarding of the process, and 50 mg. showed a very strong retardation.

The influence of manganese on the alcoholic fermentation of Saccharomyces ellipsoideus and S. apiculatus, CLARA SEISS (*Ber. K. Lehranst. Wein, Obst u. Gartenbau Geisenheim, 1908, pp. 167–170*).—The addition of 1 per cent of manganese nitrate to musts being fermented by *S. apiculatus* produced a higher degree of fermentation than in those with no addition. *S. ellipsoideus* (Piesport and Laureiro) was only influenced when as much as 1.8 per cent of manganese nitrate was present. The limit of its efficiency was found to be 2.5 per cent of the salt.

The nucleic acid of yeast, P. A. LEVENE (*Biochem. Ztschr., 17 (1909), No. 1–3, pp. 120–131; abs. in Chem. Abs., 3 (1909), No. 15, pp. 1764, 1765*).—On the basis of experimental data a constitutional formula is suggested.

An experimental study of bagasse and bagasse furnaces, E. W. KERR and E. M. PERCY (*Louisiana Stas. Bul. 117, pp. 106, figs. 45*).—This is an experimental study of bagasse as a fuel and of the adaptability of the various types of furnaces for burning it. With reference to its fuel value various factors were considered, as, for instance, the amount of bagasse burned, its content of moisture, sucrose, fiber, ash, and calorific value, the grate and heating surface and their ratio, the total boiler horsepower per ton of cane in 24 hours, bagasse horsepower per ton of cane in 24 hours, diameter and height of the smokestack, dimensions of the furnace, draft and temperature in the furnace, draft, temperature, and composition of the flue gases, volume of air supplied to the furnaces by the blower and draft doors, and the excess of air. The furnaces employed in the test belonged to the Dutch oven, the ordinary, or the hearth types, or to a combination of one or more of these types.

In the furnace tests it was found that the heat value of the dry bagasse in Louisiana factories varied between 8,283 and 8,431 B. T. U. The average of all was 8,368 B. T. U. With Cuban factory conditions the limits were 8,300 and 8,650 B. T. U., with an average of 8,433 B. T. U. There was, therefore, but very little variation between the heat value of the bagasse for the two places. The factors which influence this in the dry bagasse are the sucrose and ash. From the tables for wet bagasse it is shown that the ash content averaged 1.14 per cent for Louisiana bagasse and for Cuban bagasse 0.79 per cent. Calculating these results to dry substance and comparing them with the above heat values, the value per pound of actual combustible material (dry bagasse minus ash) is for Louisiana bagasse 8,559 B. T. U. and for Cuban bagasse 8,568

B. T. U. Therefore, a varying ash content produces a corresponding difference in the heat value. During the combustion of the bagasse the average flue gas analysis yielded 9.01 per cent carbon dioxid, 9.83 per cent oxygen, and 0.17 per cent carbon monoxid, a total of 19.01 per cent. This is 2 per cent less than the theoretical figures, or the quantity which might exist if carbon compounds and oxygen were the only constituents of the gas analyzed. The rate of combustion (pounds of bagasse per square foot of grate surface per hour) varied between 44 and 197, and the author assumes that under proper conditions the rate should never be under 100. The air supply to the pound of bagasse was on the average 33.4 cu. ft., which with a moisture content of 52 per cent in the bagasse is equivalent to 16.03 cu. ft. per pound as fired. The blower supplied on the average 24.7 per cent of the air.

In regard to the relation of furnace temperature to air excess it was found that with an average air excess of 85 per cent the average furnace temperature was 1,475°, or with an average excess of 272 per cent 1,146°, showing that the furnace temperature varies inversely with the air excess. "An air excess of 50 per cent or less is sufficient for bagasse."

In studying the control of the air supply, the influence of the stack damper, the ash-pit doors, and the speed of the blower were considered. With an increased air excess and wide-opened dampers there was much increase in stack temperature, but the latter may also be due to an overload of bagasse on the heating surface. According to the results in this series it is evident that the stack temperature may be used to advantage in controlling the air. In 50 per cent of the furnaces tested the stack temperature was above 600° F. Those of the Louisiana furnace temperatures, which could be measured by a 700° F. thermometer, averaged 540° F., whereas in only one of the Cuban houses was the temperature above 600° F. The cause for the difference in stack temperature was found in the different areas of heating surface. From the results of the tests in the Louisiana houses it was seen that the high stack temperature was always present when the furnace had an overload of heating surface.

In addition to the furnace tests an evaporative test was made with a 318 H. P. boiler (rated) in order to establish the evaporation value of bagasse. The weights of bagasse employed were obtained by difference, that is, by subtracting weight of juice from total amount of cane employed. With an overload of 24 per cent firing, based on the builder's rating, an equivalent evaporation of 2¼ lbs. of water per pound of bagasse was found. The amount of moist fuel fired (52.1 per cent of water) was 6,017 lbs. per hour, and the temperature of the furnace was on the average 1,200° F.

Comparing these results with those obtained in one of the test series, which had a normal evaporation of about 3 lbs. per square foot of heating surface, it is shown that the evaporation by the bagasse was 6.1 lbs. of water per square foot, which is an excess. Calculating on a normal basis, "not more than 1.5 lbs. of bagasse should be burned per square foot of heating surface per hour." The boiler capacity per ton of cane for 24 hours is less in Louisiana than in Cuban or Hawaiian houses. "Not less than 1.5 boiler H. P. should be provided per ton of cane for 24 hours."

Burning oil and bagasse together "may result in higher furnace temperatures than with either of them alone, also in better combustion if the furnace is of proper design, but care must be taken to prevent overloading the heating surface.

"A good working furnace depends more upon the proportion of heating surface to grate surface, rate of combustion and other matters of design, and operation than upon the form or type.

"Higher temperatures are produced in the separate oven than in the ordinary grate type.

"In the ordinary grate type much of the advantage of the oven type may be secured by increasing the distance from grate to boiler."

Sugar and corn sirup (starch glucose) as raw materials for the confectionery and preserves industries, L. K. BOSELEY (*Internat. Sugar Jour., 11 (1909), No. 127, pp. 343, 344*).—A summary of the requirements for the above-named products in the confectionery and preserving industries, based upon experiments by the author.

A uniform nomenclature for the products of sugar manufacture, F. STROHMER (*Ztschr. Ver. Deut. Zuckerindus., 1909, No. 644, II, pp. 778–782*).—A plea for the unification of terms and descriptions of the products of the sugar industry.

METEOROLOGY—WATER.

Meteorology, E. KLEINSCHMIDT (*Jahrb. Naturw., 24 (1908–9), pp. 112–133*).—Progress in aerology, solar radiation, composition of the atmosphere, atmospheric electricity, terrestrial magnetism, weather forecasting, and other meteorological subjects, is reviewed as usual.

Brief list of meteorological text-books and reference books, C. F. TALMAN (*U. S. Dept. Agr., Weather Bur., 1909, pp. 16*).—This is a list of about 150 works suitable for general, scientific, and university libraries in the United States, and "intended to provide a ready means of complying with the many requests received by the Weather Bureau from teachers, students, and others for the titles of books dealing with meteorology and its several branches."

Meteorological observations at the Massachusetts Agricultural Experiment Station, J. E. OSTRANDER and C. M. DAMON (*Massachusetts Sta. Met. Buls. 249, 250, pp. 4 each*).—Summaries of observations at Amherst, Mass., on pressure, temperature, humidity, precipitation, wind, sunshine, cloudiness, and casual phenomena during September and October, 1909. The data are briefly discussed in general notes on the weather of each month.

Weather observations (*New Jersey Stas. Rpt. 1908, pp. 86–89, 298–301*).—Tables are given which show daily and monthly precipitation at the New Jersey Station farm during the year ended October 31, 1908, monthly precipitation since January 1, 1896, monthly maximum and minimum means of temperature since 1896, and rainfall, temperature, and sunshine during the growing season, April to September, for the State, for the period from 1889 to 1908.

Physical and meteorological service, J. JAUBERT (*Ann. Observ. Munic. (Observ. Montsouris) [Paris], 9 (1908), No. 3–4, pp. 373–422*).—Tables of observations on temperature, pressure, precipitation, humidity, wind, and evaporation for the year ended November 30, 1908, are given.

Meteorology and climate [of New South Wales] (*Off. Yearbook N. S. Wales, 1907–8, pp. 15–23*).—This article summarizes in tables and text the principal meteorological and climatic conditions of New South Wales.

On the composition of atmospheric air, G. CLAUDE (*Compt. Rend. Acad. Sci. [Paris], 148 (1909), No. 22, pp. 1454–1456, fig. 1; abs. in Beibl. Ann. Phys., 33 (1909), No. 20, p. 1050*).—Apparatus and methods employed in the determination of the rarer constituents of the atmosphere are described.

Analysis of air, P. MIQUEL (*Ann. Observ. Munic. (Observ. Montsouris) [Paris], 9 (1908), No. 3–4, pp. 243–257*).—Numerous analyses of the air of parks, tunnels of underground railways, dwellings, public monuments, etc., are reported.

Apparatus for the purification of air (*Rev. Sci. [Paris], 47 (1909), II, No. 5, p. 144*).—A brief account is given of an apparatus and process proposed by

C. Richet, based upon interruptions of the flow of the current of air while in contact with viscous liquids, glycerin and soap solution, or simply water.

The duration of hailstorms (*Rev. Sci.* [*Paris*], *47* (*1909*), *II, No. 17, p. 533*).—This is a note on a report by Plumandon on a large number of observations from 1886 to 1908. While a large number of the storms observed were of short duration some of them lasted as long as an hour. Storms of long duration were observed at all altitudes from 300 to 1,200 meters. No general cause is assigned for such storms.

A test of hail protection, DE BEAUCHAMP (*Compt. Rend. Acad. Sci.* [*Paris*], *149* (*1909*), *No. 1, p. 73; abs. in Jour. Agr. Prat., n. ser., 18* (*1909*), *No. 49, p. 767*).—An attempt to dissipate hailstorms in a region near Vienna subject to great damage from this source by means of high towers carrying metal conductors connecting with copper plates in contact with the ground water is briefly described.

Some observations on dew ponds, E. A. MARTIN (*Geogr. Jour., 34* (*1909*), *No. 2, pp 174–195, dgms. 7; abs. in Nature* [*London*], *81* (*1909*), *No. 2085, pp. 458, 459*).—This article reports a series of observations in Sussex on methods of construction and conditions determining the filling of dew ponds. The observations indicate that dew furnishes a comparatively small part of the water collected in these ponds, particularly in case of ponds on the lower lands. During the winter, rain, snow, and mist as well as dew contribute to the water supply. In summer and in times of drought the water supply is derived from mist, fog, and dew.

Dew ponds (*Agr. Students' Gaz., n. ser., 14* (*1909*), *No. 4, pp. 105–107*).—This is a concise summary of information regarding the nature, construction, and use of dew ponds.

Fluorescent substances in waters, F. DIÉNERT (*Ann. Observ. Munic.* (*Observ. Montsouris*) [*Paris*], *9* (*1908*), *No. 3–4, pp. 322–325, fig. 1*).—Apparatus and delicate methods for studying fluorescent substances in waters are described.

Methods used for measuring fluorescence in waters, F. DIÉNERT (*Ann. Observ. Munic.* (*Observ. Montsouris*) [*Paris*], *9* (*1908*), *No. 3–4, pp. 326–328, figs. 2*).—Apparatus and delicate methods for this purpose are described.

The use of the acoustele in hydrology, F. DIÉNERT (*Ann. Observ. Munic.* (*Observ. Montsouris*) [*Paris*], *9* (*1908*), *No. 3–4, pp. 315–321, figs. 2*).—The construction of the Daguin acoustele, an acoustic cornet, is described and its use in locating underground water is explained.

Study of the subterranean waters of Paris, P. MIQUEL (*Ann. Observ. Munic.* (*Observ. Montsouris*) [*Paris*], *9* (*1908*), *No. 3–4, pp. 303–305*).—Detailed examinations of a number of samples are reported.

Potable and drainage waters of Paris, P. MIQUEL (*Ann. Observ. Munic.* (*Observ. Montsouris*) [*Paris*], *9* (*1908*), *No. 3–4, pp. 258–304*).—Bacteriological and chemical examinations of samples of water from reservoirs in Paris and its environs and from fountains, schools, and the Seine, as well as of sewage, are reported.

Pure water in town and country (*Va. Health Bul., 1* (*1909*), *No. 14, pp. 363–376, figs. 6*).—It is stated that the purpose of this bulletin is to explain the conditions which are necessary for the maintenance of a good water supply and those which lead to contamination and impurity of water. Simple means of protecting springs and wells from pollution are described.

Drinking water on trains (*Va. Health Bul., 1* (*1909*), *No. 10, pp. 284, 285*).—The water supply on railroad trains in Virginia was found by the state board of health to be satisfactory but objections were made to the manner of handling ice. It is stated that the railroads have ample regulations for such matters but that they are disregarded.

Changes in drinking water due to the metal of the distributing conduits, O. FERRIER (*Rev. Sci. [Paris], 47 (1909), II, No. 8, p. 248*).—It is shown that water containing a small amount of mineral matter more readily attacks lead and iron pipes than that containing a large amount of mineral matter, and it is proposed to overcome the danger from this source by adding a small amount of lime to the water.

The Yallahs smell, S. F. ASHBY (*Bul. Dept. Agr. Jamaica, n. ser., 1 (1909), Nos. 1, pp. 42, 43; 2, pp. 73–92, pls. 3*).—Chemical and bacteriological studies of the waters and muds of the Yallahs salt ponds near Kingston, Jamaica, are reported, showing that the offensive odor of these ponds is due mainly to hydrogen sulphid produced by *Microspira æstuarii*.

Regulations regarding potable waters (*Rev. Sci. [Paris], 47 (1909), II, No. 16, p. 504*).—The regulations promulgated by the government of France with regard to the potable waters to be used in the marine service are given.

Are present day standards of analysis reliable as a guide to the wholesomeness of drinking water? C. J. R. MCLEAN (*Jour. Roy. Sanit. Inst., 30 (1909), No. 9, p. 394*).—It is pointed out that "there is seldom any connection between the purity or impurity of water supplies in rural or small urban districts and the existence or prevalence of typhoid fever," and it is held that "absence of typhoid fever in the rural and small urban districts, with impure or polluted water (according to modern standards), is a proof of the nonreliability of such standards."

New bacteriological standard for water analyses, T. A. STARKEY (*Jour. Roy. Sanit. Inst., 30 (1909), No. 9, pp. 391, 392*).—The author proposes the "labyrinth" or "zig-zag" method for isolating members of the colon-typhoid family, and believes that "if representatives of the colon-typhoid group beyond about the mid-point toward the typhoid end are present, then the water is actually dangerous; it matters not in what quantity of water they are found."

Investigations on the permeability of soils for bacteria, F. DITTHORN and A. LUERSSEN (*Gsndhts. Ingen., 32 (1909), No. 41, pp. 681–686, figs. 2*).—This is a study of the efficiency of soil filtration as a means of purifying water.

Fundamental principles of sewage purification on land, R. HERING (*Engin. News, 61 (1909), Nos. 18, pp. 493–496; 21, pp. 583–586; 22, pp. 605, 606*).—Conclusions based chiefly upon results of inspection of European works, but also on observations on works in this country, are summarized and the relation of the different factors involved in sewage purification is reduced to an equation—$p=b\ a\ t$, in which b is the bacterial surface in square feet, a the air supply in cubic feet per day, and t the time in minutes. These vary directly with the number of persons furnishing the sewage.

Standards of purification for sewage effluents, J. T. THOMPSON (*Jour. Roy. Sanit. Inst., 30 (1909), No. 9, pp. 407, 408*).—The general principles and the adaptations to local conditions are discussed.

Organic colloid substances in sewage waters, E. ROLANTS (*Rev. Hyg. et Pol. Sanit., 31 (1909), No. 8, pp. 775–784*).—The investigations reported indicate that there was an increase of the proportion of colloid substances to total oxidizable matter in the septic tank but a decrease on the bacterial beds. The proportion of organic nitrogen to organic carbon in the colloid substances decreased in the septic tank and in the passage through the bacterial beds.

A brief bibliography of literature relating to this subject is apppended.

Sewage sludge disposal at Brockton, Mass. (*Engin. News, 62 (1909), No. 10, p. 251, fig. 1*).—A brief account is given of the use of manure spreaders for the handling of the sludge and of the history of sludge disposal at Brockton since the works were started 15 years ago. The sludge is given to farmers in the

vicinity for a period of 5 years in consideration of its immediate removal from the plant at the time of cleaning the sludge beds.

The material has been very conveniently and efficiently handled by means of manure spreaders. It has been used as a fertilizer on corn, potatoes, millet, and other grasses with very good results. With corn it appears to give good results when used alone. With other crops better results are obtained when potash and phosphoric acid are added.

While the composition of the material varies with the season, the moisture ranging from 5 to 50 per cent, an average of several analyses shows moisture 16.22, phosphoric acid 0.78, potassium oxid 0.51, nitrogen 1.45, calcium oxid 0.3, and insoluble matter, sand, etc., 70.13 per cent.

The conditions and object of agricultural hydrotechnical work in Russia, J. JILINSKY (*Conditions et But des Travaux Hydrotechniques Agricoles en Russie. St. Petersburg: Govt., 1908, pp. 22*).—A brief general statement.

SOILS—FERTILIZERS.

Report of the soil chemist and bacteriologist, J. G. LIPMAN ET AL. (*New Jersey Stas. Rpt. 1908, pp. 91–147*).—This report contains accounts of investigations on ammonia formation in soils and culture solutions; moisture conditions as affecting the formation of ammonia, nitrites, and nitrates; soil bacteriological methods and culture media; behavior of Azotobacter in culture solutions; and soil inoculations with *A. beyerincki.*

The studies of ammonia formation in shale and sandy loam soils and in culture media of different kinds showed among other things that the addition of dextrose as a rule retarded the formation of ammonia or hastened its transformation into other forms of combination. The addition of peptone, on the other hand, hastened the formation of ammonia. With peptone alone there was decidedly more rapid formation of ammonia in the shale soil than in the sandy loam soil. The addition of dextrose alone apparently did not cause a very great increase in the number of bacteria in the soil, whereas the addition of peptone alone caused an enormous increase. When dextrose was used with the peptone the increase was checked to an appreciable extent. The addition of starch and filter paper did not exert the same depressing effect as the dextrose.

In experiments with a gravelly loam soil it was found that saturation of the soil with water greatly increased the rate of ammonification.

From the results in general "it would seem . . . that the suppression of the aerobic decay bacteria and the more vigorous growth of the anaerobic putrefactive bacteria lead to the production of more ammonia in the peptone solutions. . . . The amounts of ammonia produced in the soil itself are a function of the bacteriological activities and soil conditions, in this particular instance largely moisture and aeration conditions. . . . Varying moisture conditions favor the production of more or less ammonia as they favor or depress the activities of the ammonifying bacteria. At the same time, they probably produce changes in the bacterial flora which are not merely quantitative, but at times also qualitative."

Saturation of the soil apparently increased the activity of urea bacteria as well as putrefactive bacteria.

The studies of the effect of the addition of dextrose with varying amounts of moisture on ammonification gave inconclusive results.

A decided decrease in nitrates, particularly in certain soil samples, was observed which is attributed to the transformation of nitrate into proteid nitrogen.

Determinations of the numbers of bacteria in soil under different conditions indicated not only an enormous increase in the presence of peptone but also an approximate relation between the number of bacteria and the amount of ammonia produced.

In experiments on red shale and clay loam soils with peptone, urea, dried blood, and albumen, it was found that ammonification was most active in the clay loam soil in case of the peptone and in the shale soil with urea and dried blood. As measured by ammonification the urea, peptone, dried blood, and egg albumen were available in the order given.

Minor studies on nitrification, denitrification, and nitrogen fixation in the same soils, and on media for quantitative estimation of soil bacteria, as well as miscellaneous data concerning the growth of Azotobacter in culture solutions are also reported. The latter studies included the influence of small amounts of calcium carbonate, acid potassium phosphate, previous treatment of the soil, and varying amounts of mannite on the nitrogen fixation of Azotobacter.

Soil inoculations with *A. beyerincki* in soils on which corn was grown gave results which are summarized as follows: "Ground limestone hastened the decomposition of the inert humus compounds and made available a larger supply of nitrogen to the corn crop. Applications of ground limestone at the rate of 4 tons per acre proved even more effective than applications of 2 tons per acre in hastening the decomposition of the inert humus compounds. Applications of sugar, starch, and ground filter paper depressed the yields of dry matter and of nitrogen in the corn crop. Inoculation with *A. beyerincki* in the presence or absence of organic substances depressed rather than increased the yields of dry matter and of nitrogen in the corn crop."

The effect of partial sterilization of soil on the production of plant food, E. J. Russell and H. B. Hutchinson (*Contrib. Lab. Rothamsted Expt. Sta., 1909, pp. 111–144, pls. 2, figs. 4; reprinted from Jour. Agr. Sci., 3 (1909), No. 2, pp. 111–144, pls. 2, figs. 4*).—The soil used in these investigations contained moderate amounts of nitrogen, organic matter, and calcium carbonate. It was partially sterilized, either by heating to 98° C. or by adding 4 per cent toluene. In the latter case the toluene was either allowed to evaporate at the end of 3 days by spreading out the soil in a thin layer or it was left in the soil during the whole of the experimental period. In a few of the experiments the soils were heated to 125° to kill all organisms. After treatment the soils were moistened and kept for definite periods at ordinary laboratory temperatures in bottles stopped with cotton wool.

Observations were made on the production of ammonia and unstable nitrogen compounds, changes in humus and total amount of nitrogen, and on nitrification, and the part played by bacteria in these transformations. The effect of the treatment on the productiveness of the soil was studied in pot experiments with rye.

The results showed that partial sterilization increased the amount of ammonia produced and the increased productiveness of soils so treated is ascribed to this increase of ammonia.

"The excess of ammonia is the result of increased decomposition of soil substances by bacteria.

"Hiltner and Störmer's discovery that the bacteria increase rapidly after partial sterilization, and finally become much more numerous than in the original, untreated soil, is confirmed. The increase in number proceeds pari passu with the increase in ammonia.

"The new bacterial flora arising after partial sterilization is a more potent decomposing agent than the original flora, but the individual species have not

become more, but apparently less potent. The increased decomposing power of the new flora is associated with its numerical superiority over old flora.

"The rates of decomposition and of bacterial increase in the toluened soil were found to be adversely affected by the addition of the original untreated soil. The original soil therefore contains some factor which limits bacterial action.

"Chemical hypothesis having been found unsatisfactory the factor is shown to be biological. Large organisms (protozoa) were found in the untreated, but not in the partially sterilized soils, at least two of which are known to destroy bacteria.

"These large competing and destructive organisms are killed by heat and most of them by toluene, and can then serve as food for bacteria. In both these directions the effect of partial sterilization is beneficial.

"As the effect of partial sterilization in increasing productiveness is shown on so many soils, and apparently always in the same way, it may be expected that these competing and destructive protozoa are of common occurrence and constitute an important factor in soil fertility.

"In relation to plant growth partially sterilized soils are peculiar in that they supply not nitrate, but other nitrogen compounds such as ammonia, to the plant. The nitrifying organisms will develop if they get into the toluened soil, but they did not work in the heated soils. With this difference in the course of nitrogen nutrition may be correlated the difference in nitrogen content of the plant and in the character of growth."

Experiments on the accumulation of green manure nitrogen in light sandy soils, C. VON SEELHORST (*Mitt. Deut. Landw. Gesell., 24 (1909), No. 33, pp. 512–516*).—This is a report of a continuation of experiments with large vegetation tanks (E. S. R., 19, p. 319; 20, p. 316).

The results reported show that in the case of wheat about the same amounts of nitrogen were removed in the drainage and in the crop, but that this was not true in the case of rye and barley. With barley on soil which had received a late green manuring the greater part of the nitrogen removed from the soil was found in the crop. With rye on soil receiving an early green manuring the greater part was found in the drainage. Larger losses of the nitrogen of the soil were observed in the case of potatoes than with cereals and this is accounted for by the larger proportion of nitrogen removed in the drainage. The amount taken up in the crop was the same with potatoes as with cereals.

On the relation of native legumes to the soil nitrogen of Nebraska prairies, F. J. ALWAY and R. M. PINCKNEY (*Jour. Indus. and Engin. Chem., 1 (1909), No. 11, pp. 771, 772*).—Analyses are reported which show the distribution of nitrogen in typical Nebraska prairie soils at different depths down to 6 ft., and the probable relation of the nitrogen content of the soil to the natural vegetation, particularly the leguminous plants, is discussed.

It was found that the nitrogen in one of the soils to a depth of 6 in. varied from 0.25 to 0.317, with an average of 0.284 per cent, and it is estimated from the data obtained that the soil contained about 10,000 lbs. of nitrogen per acre to a depth of 2 ft. It is estimated that the natural growth of leguminous plants on this soil furnishes about 10 lbs. per acre of nitrogen annually. The indications are that the nitrogen content of the soil has long since reached an equilibrium.

Soil nitrogen, J. WRIGHTSON (*Agr. Gaz. [London], 70 (1909), No. 1854, p. 30*).—In this article it is contended that leguminous plants are not the only fixers of atmospheric nitrogen.

Some effects of nitrogen-fixing bacteria on the growth of nonleguminous plants, W. B. BOTTOMLEY (*Proc. Roy. Soc. [London], Ser. B, 81 (1909), No. B*

548, pp. 287–289; Centbl. Bakt. [*etc.*], *2. Abt., 25* (*1909*), *No. 5–9, pp. 270–272; abs. in Chem. Zentbl., 1909, II, No. 9, p. 742*).—The nitrogen-fixing power of Pseudomonas alone and combined with Azotobacter (both obtained from root tubercles of Cycas) was studied in culture experiments and in pot tests with barley, oats, parsnips, and hyacinths. The results as measured by the increase of nitrogen in the culture solution and by the growth of the plants indicated in the author's opinion a decided fixation of nitrogen by the combined cultures.

The fixation of nitrogen by soil bacteria, A. D. HALL (*Nature* [*London*], *81* (*1909*), *No. 2073, p. 98*).—Discussing the above experiments, the author maintains that the results of the experiments were not conclusive because there were no tests of Azotobacter alone and no means of accurately measuring the experimental error.

Nitrogen-fixing bacteria and nonleguminous plants, W. B. BOTTOMLEY and A. D. HALL (*Nature* [*London*], *82* (*1909*), *No. 2095, pp. 218, 219*).—This is a further discussion of the reliability of the conclusions drawn by Professor Bottomley noted above.

Important bacteria in Jamaica soils, S. F. ASHBY (*Bul. Dept. Agr. Jamaica, n. ser., 1* (*1909*), *No. 2, pp. 92–96, pl. 1*).—Studies of the rate of nitrification and nitrogen fixation in 3 different soils are reported, as well as tests of a culture prepared by Bottomley for increasing the assimilation of nitrogen by sugar cane. This culture was found to contain Clostridia but not Azotobacter and was without effect when used on sugar cane.

The regeneration of the nitrogen-fixing power of bacteria, G. BREDEMANN (*Centbl. Bakt.* [*etc.*], *2. Abt., 23* (*1909*), *No. 1–5, pp. 41–47*).—A controversial note replying to Pringsheim (E. S. R., 20, p. 18).

The identity of nitrogen-fixing Clostridia, H. PRINGSHEIM (*Centbl. Bakt.* [*etc.*], *2. Abt., 24* (*1909*), *No. 18–22, pp. 488–496*).—This is a controversial article replying to criticisms of the author's work by Bredemann (noted above).

The fertility of the soil, H. PUTTEMANS (*Ann. Escola Polytech. São Paulo, 9* (*1909*), *pp. 301–344, pl. 1, figs. 10*).—This article reviews the present knowledge and theories with regard to soil fertility, discussing the physical, chemical, and micro-biological factors determining it.

A bibliography of 41 references is appended.

Analyses of soils (*Rev. Asoc. Rural Uruguay, 38* (*1909*), *No. 8, pp. 586–589, dgms. 2*).—Physical and chemical analyses of several samples of soil from the Campana model farm in Uruguay are reported with a description of the character of the soil at different depths.

The natural regeneration of worn out cocoa soils, W. C. JARDINE (*Dept. Agr. Trinidad, Bul. Agr. Inform., 1909, n. ser., No. 63, pp. 81–88*).—The utilization of the natural vegetation for restoring the fertility of such soils is discussed.

The uncultivated soils in Denmark (*Rev. Sci.* [*Paris*], *47* (*1909*), *II, No. 5, pp. 142, 143*).—This is a brief note on the activities of the Landes Society of Denmark in the reclamation of swamp and other unproductive soils.

On the earth temperature at Osaka, T. OKADA (*Tôkyô Sûg. But. Kizi* [*Proc. Tôkyô Math. Phys. Soc.*], *2. ser., 4* (*1908*), *No. 21, pp. 427–438; abs. in Beibl. Ann. Phys., 33* (*1909*), *No. 14, p. 800*).—Hourly observations of temperature at the surface, and at depths of 0.1, 0.3, and 0.6 meter during 1901 to 1906, and monthly mean temperatures at the surface and at depths of 0.3, 1.2, 3, and 5 meters from 1895 to 1904, are reported. On the basis of these observations and of determinations of the moisture content of the soil studies were made of the diurnal and annual variation of the temperature of the soil, diurnal and annual heat exchanges of the soil, and thermal conductivity of the soil. The specific heat

of the soil at depths of 0.3 and 1 meter with a water content of 0.074 gm. per cubic centimeter as a mean of 5 measurements was 0.204 gram-calorie per cubic centimeter, hence the thermal capacity of the soil per unit volume was 0.4. The diurnal variation of the temperature became almost insignificant at a depth of 60 cm.

The extreme temperatures for each month at the different depths, as well as the constants as analyzed by the Fourier series, are given. At a depth of 5 meters the minimum temperature was observed in May, the maximum in November. The analysis by the Fourier series indicates that the soil studied may be taken roughly "as a homogeneous substance, and that the differential equation for linear flow of heat with a constant diffusivity may be applicable for any stratum of the soil at that locality. . . .

"The amount of the diurnal thermal exchange of the Osaka soil is 42.3 gram-calories per unit area in average. It is subject to a very great variation in the course of a year, being greatest in May and least in January. The diurnal heat content varies with season and weather condition. . . .

"The thermal conductivity of the Osaka soil diminishes regularly with the depth. . . .

"There is a marked annual variation in the diffusivity of soil. The maximum occurs in March and the minimum in August in the surface layer; the maximum takes place in July and the minimum in August in the second layer; the maximum occurs in July and the minimum in November in the third layer; and the maximum takes place in February and the minimum in September. This periodic variation of the thermal diffusivity of soil is probably due to the annual variation of the soil temperature and of water contained in pore spaces of the soil."

The water economy of the soil, QUANTE (*Fühling's Landw. Ztg., 58 (1909), Nos. 16, pp. 592–605; 17, pp. 609–627*).—This article reviews investigations bearing on the subject and discusses the importance of water in plant growth on different kinds of soil, as well as the influence of cultural methods on the water content of soils.

Soil moisture in crop production (*Mark Lane Express, 102 (1909), No. 4067, p. 254*).—This is a note on a paper read by F. H. King at the meeting of the British Association at Winnipeg. The paper discussed water as a plant food and as a carrier of plant food in the soil and plant, as well as the amount of water required to produce a ton of dry matter in different crops. Omitting evaporation, this is stated to amount to 200 to 400 tons. It is estimated that, including evaporation, 3.6 to 4.3 in. of water are required to produce 12 bu. of wheat or 20 bu. of barley.

Soil acidity, W. P. KELLEY (*Amer. Fert., 31 (1909), No. 4, pp. 22–24*).—This article discusses briefly the various methods which have been proposed for the determination of soil acidity as well as the origin of the acid condition and practical methods of correcting acidity.

Effects of salts on soils, C. S. TAYLOR (*Dept. Agr. Bengal, Quart. Jour., 2 (1909), No. 4, pp. 281–287*).—This article describes the types of alkali soils occurring in Bengal. These include not only the so-called usar and reh soils, which have been formed by the accumulation of salts resulting from decomposition of the soil constituents in place, but also the nitrate soils and those which have been rendered saline by frequent inundations of brackish water. Attention is directed mainly to the latter class in this article, and it is shown that their sterility is not due entirely to excess of saline substances but partly at least to the fact that they are almost absolutely devoid of bacteria and contain very small amounts of nitrogen. Determinations of the soluble salts in such soils at different depths are reported.

Factors influencing the phosphate content of soils, A. R. WHITSON and C. W. STODDART (*Wisconsin Sta. Research Bul. 2, pp. 41–60*).—This contains two articles which have been noted from other sources (E. S. R., 20, p. 1114; 21, p. 218).

Fertilizers for Wisconsin farms, F. W. WOLL (*Wisconsin Sta. Bul. 180, pp. 3–46*).—This bulletin calls attention to the increasing need of fertilizers in Wisconsin and discusses methods of conserving soil fertility, the care of stable manure, and the purchase and use of commercial fertilizers. A report is also given of the results of inspection during 1909 of 31 brands of licensed fertilizers prepared by 11 manufacturers.

On the value of barnyard manure in agriculture, O. VIBRANS (*Bl. Zuckerrübenbau, 16 (1909), Nos. 7, pp. 106–110; 8, pp. 124–127; 9, pp. 131–134*).—A general discussion.

The fertilizing value of pigeon manure, A. LOLLI (*Staz. Sper. Agr. Ital., 42 (1909), No. 4–6, pp. 356–360; abs. in Chem. Zentbl., 1909, II, No. 10, pp. 856, 857*).—The author discusses the value of commercial pigeon manure on the basis of its content of phosphoric acid (1.7 per cent), potash (0.15 per cent), and nitrogen (3.97 per cent), with moisture 7.8 per cent. The results of counts of seeds in the manure are also given.

Top-dressing sugar beets with liquid manure, A. KAUSEK (*Mitt. Deut. Landw. Gesell., 24 (1909), No. 32, pp. 502–507*).—Good results with liquid manure as compared with nitrate of soda are reported. The author advises keeping the manure heap moist and collecting and applying the liquid manure separately.

Top-dressing of the sugar beet with liquid manure, A. KUHNERT (*Mitt. Deut. Landw. Gesell., 24 (1909), No. 36, pp. 549, 550*).—The results of the experiments here reported confirm those of Kausek noted above.

The water capacity of peat litter and its determination, B. TACKE and H. MINSSEN (*Ztschr. Moorkultur u. Torfverwert., 7 (1909), No. 3, pp. 141–149*).—In the experiments reported in this article it was found that drying decreased the absorptive capacity of peat litter and that the coarser the air-dry material the less the absorption. The method used in making the tests of absorptive power is described.

The nitrogen problem in crop production, E. J. RUSSELL (*Jour. Roy. Agr. Soc. England, 69 (1908), pp. 104–114*).—This article is based mainly upon investigations made at Rothamsted and discusses the sources of nitrogen available to the farmer, including nitrogen compounds in the soil, purchased manures, purchased feeding stuffs, nitrogen fixed by bacteria alone and in symbiosis with leguminous plants, and losses of nitrogen on the farm due to drainage and to bacterial action. The value of a rotation adapted to the maintenance of the nitrogen supply is pointed out.

Manufacture of air nitrate fertilizers, H. BORDEWICH and W. H. H. WEBSTER (*U. S. Dept. Com. and Labor, Bur. Manfr., 1909, pp. 16, figs. 2*).—This report briefly discusses the fertilizer trade of the United States, the nitrate fertilizer factories in Norway, and the cyanamid industry in Canada.

It is stated that "the imports of materials largely used in the manufacture of fertilizers, and of fertilizers not included under other names, amounted to $12,205,710 in 1907 and $11,968,537 in 1908. Sulphate of ammonia to the value of $1,847,772 and nitrate of ammonia to the value of $425,573 were also imported in 1908. A small part of the nitrate and from one-half to two-thirds of the sulphate were employed in making fertilizer. The extent to which the Chilean nitrate fields are drawn upon by the United States is shown by the imports, which increased from $8,855,753 in 1904 to $13,595,458 in 1907 and $12,277,464 in 1908. That the value of nitrates imported from Chile is perhaps underestimated is shown by the annual reports of United States Consul Alfred

A. Winslow, of Valparaiso, who gives the declared exports of nitrate of soda from Chile to the United States for the fiscal year ended June 30, 1907, as $16,699,723, and for 1908, $14,765,250.

"Exports of fertilizers from the United States to other countries amounted in value to $8,596,711 in 1907 and to $10,970,931 in 1908. Adding to the value of the imports of nitrates the value of materials imported and largely used in the manufacture of fertilizers and the value of fertilizers imported and declared as such, and then deducting the exports of fertilizers from this country, the conclusion is reached that a balance of approximately $17,000,000 goes abroad every year for fertilizers."

The nitrate deposits and industry in Chile, L. LEMA (*Mining Sci., 58 (1908), Nos. 12, pp. 225–227, figs. 3; 13, pp. 244, 245, figs. 3; 14, pp. 265–267, figs. 4; Chem. Engin., 10 (1909), No. 1, pp. 1–9, figs. 12*).—This is a series of historical, statistical, and technical articles, giving also methods of extraction and preparation of the nitrate.

Calcium and sodium nitrates, J. URBAN (*Bl. Zuckerrübenbau, 16 (1909), No. 8, pp. 113–116*).—From his own experiments and those of other investigators, the author concludes that as regards yield calcium nitrate is fully as effective as sodium nitrate and that as regards quality of the crop it is apparently superior.

Investigations on denitrification, A. G. DOYARENKO (*Izv. Moskov. Selsk. Khoz. Inst.* [*Ann. Inst. Agron. Moscou*], *15 (1909), No. 1, pp. 98–108, figs. 6*).—In experiments to determine the influence of the different components of manure on the yield, adding nitrogen also in the form of nitrate of soda, ammonium nitrate, and ammonium sulphate, it was observed that an injurious effect resulted when strawy manure was used in connection with sodium nitrate and ammonium nitrate, but not in the case of ammonium sulphate.

The comparative value of nitrate of sodium and sulphate of ammonium as manures (*Agr. Gaz.* [*Tasmania*], *17 (1909), Nos. 5, pp. 112–119; 6, pp. 140–142; 7, pp. 161, 162*).—This article is based upon experiments at Rothamsted, Woburn, and other places in England and Scotland.

Among the conclusions reached are that sulphate of ammonia can not be profitably used on soil deficient in calcium carbonate, but should be plowed under on soil containing a large amount of calcium carbonate. As a rule it gives the best results when plowed or harrowed in before seeding. It does not give its best results on dry soils and in dry seasons since it is not so readily nitrified under such conditions, and in any case is slower in action than nitrate of soda. The effect of sulphate of ammonia is more dependent than that of nitrate of soda upon the presence of an abundant supply of mineral fertilizers.

In a 10-year series of field experiments with cereals the average return of grain was 93 from sulphate of ammonia as compared with 100 from nitrate of soda, and of straw 79 from the sulphate as compared with 100 from the nitrate. With hay crops the sulphate was 85 to 88 per cent as efficient as nitrate of soda.

In 10-year experiments at Rothamsted the yield of potatoes with the sulphate was on an average equal to that obtained with the nitrate. With mangels the sulphate was 76 per cent as efficient as the nitrate, but the quality of the roots was better with the sulphate.

In experiments with turnips in Scotland and the north of England the sulphate and nitrate were apparently equally effective.

Application of sulphate of ammonia on light soils (*Mark Lane Express, 101 (1909), No. 4072, p. 403*).—Reference is made to experiments in which sulphate of ammonia was applied (1) entirely in autumn, (2) one-fourth in autumn and three-fourths in spring, (3) all in spring in one application, and (4) in spring in two equal applications, the first just when growth had started and the sec-

ond 3 weeks later. The crop used was rye, and the experiments extended over 2 years. The soil was well supplied with potash and phosphoric acid.

Spring application gave better results than fall application. Apparently the best results can be expected from 2 applications in the spring, one just at the beginning of growth and the second about 3 weeks later. The soils should in all cases be supplied with an abundance of lime. See also a previous note (E. S. R., 21, p. 720).

The physiological characteristics of ammonium salts, D. N. Prianishnikov (*Izv. Moskov. Selsk. Khoz. Inst.* [*Ann. Inst. Agron. Moscou*], *15* (*1909*), *No. 1, pp. 24–31, figs. 2*).—The experiments reported showed that ammonium sulphate in the presence of raw phosphates exerted two opposite influences, one positive, due to the solvent action resulting from the physiological acidity of the salt, the other negative, resulting from the injurious effect on plant growth of an excess of acidity. When calcium carbonate was added in increasing amounts the acid reaction was reduced and the yield increased, except that when too much calcium carbonate was added the yield was again reduced as a result of unfavorable conditions for the assimilation of the phosphoric acid of the raw phosphate. Analysis showed that the phosphoric acid content of the crop decreased with increasing amounts of calcium carbonate.

Experiments with different organic nitrogenous fertilizers, A. G. Doyarenko (*Izv. Moskov. Selsk. Khoz. Inst.* [*Ann. Inst. Agron. Moscou*], *15* (*1909*), *No. 2, pp. 127–136*).—Experiments are reported which show that the nitrogen of castor pomace and certain wastes from tobacco factories is very effective as a fertilizer, but that the nitrogen of by-products of the biological process of water purification is very slow in action.

Nitrogen and nitric acid, R. Carl (*Österr. Chem. Ztg.*, *12* (*1909*), *No. 18, pp. 237, 238*).—This is a brief review of progress during 1906 to 1908 in electrochemical methods of utilizing the nitrogen of the air.

Fixation of atmospheric nitrogen (*Electrochem. and Metallurg. Indus.*, *7* (*1909*), *No. 7, pp. 303–305*).—Papers on the electrical fixation of atmospheric nitrogen by A. Bernthsen, S. Eyde, and N. Caro are briefly reviewed.

The manufacture of air nitrate, O. Schönherr (*Elektrotech. Ztschr.*, *30* (*1909*), *Nos. 16, pp. 365–369, figs. 4; 17, pp. 397–402, figs. 6; abs. in Sci. Abs., Sect. B—Elect. Engin.*, *12* (*1909*), *No. 138, pp. 231, 232; Electrochem. and Metallurg. Indus.*, *7* (*1909*), *No. 6, pp. 245–247, figs. 3*).—The electric process worked out by the author is fully described.

The manufacture of calcium carbid (*Engineering* [*London*], *87* (*1909*), *Nos. 2256, pp. 405–408, 410, 411, 422, figs. 19; 2257, pp. 443–445, figs. 11; 2258, pp. 477, 478, 480, 481, 492, figs. 22; 2259, pp. 520–522, figs. 12; 2260, pp. 546–550, 552, figs. 21; 2262, pp. 617–620, 634, figs. 14; 2265, pp. 720–723, figs. 6; 2267, pp. 777–780, 782, figs. 12; abs. in Sci. Abs., Sect. B—Elect. Engin.*, *12* (*1909*), *No. 139, pp. 272–274; Electrochem. and Metallurg. Indus.*, *7* (*1909*), *Nos. 5, pp. 212–216; 7, pp. 309–313, figs. 8; 8, pp. 360, 361, fig. 1*).—This article describes in detail the factories and process used at Odda, Norway, in the manufacture of calcium carbid and calcium cyanamid.

On calcium cyanamid, D. N. Prianishnikov (*Izv. Moskov. Selsk. Khoz. Inst.* [*Ann. Inst. Agron. Moscou*], *15* (*1909*), *No. 2, pp. 145–165, figs. 6*).—The results of pot experiments with different crops showed that calcium cyanamid in most cases was nearly as effective as nitrate of soda. With most plants on productive soils the time of application seemed to be of no special importance, although in this respect white mustard was somewhat more sensitive than the Gramineæ. In sand cultures the calcium cyanamid was poisonous to all plants. This appeared to be dependent to a large extent upon the biological processes by which the cyanamid is rendered available in the soil.

The loss of nitrogen in the storage of calcium cyanamid, I. V. YAKUSHKIN (*Izv. Moskov. Selsk. Khoz. Inst.* [*Ann. Inst. Agron. Moscou*], *15* (*1909*), *No. 2*, *pp. 166–176, dgm. 1*).—The experiments reported show that the loss of nitrogen in the storage of calcium cyanamid varies widely with atmospheric conditions. When the air was humid and the cyanamid was spread out in thin layers large losses (as much as 66 per cent of the total nitrogen in 7 to 8 months) were observed. On the other hand, 10 kg. of cyanamid kept in a sack in a moderately dry atmosphere lost only 10 per cent of the total nitrogen in 2 years, and in very dry air the loss was still smaller. No ammonia was observed when the cyanamid was kept under a cover glass over sulphuric acid.

Dicyandiamid, I. V. YAKUSHKIN (*Izv. Moskov. Selsk. Khoz. Inst.* [*Ann. Inst. Agron. Moscou*], *15* (*1909*), *No. 2*, *pp. 177–192*).—An attempt is made to construct a formula for this substance on the basis of results obtained by the action of nitrous acid on the dicyandiamid.

Potash silicate, J. BARCIA Y TRELLES (*Prog. Agr. y Pecuario*, *15* (*1909*), *No. 634*, *pp. 399–401*).—A complete analysis of the commercial product sold as a fertilizer is reported, as well as studies of the solubility of the potash in different solvents.

Sand cultures with various potash minerals, A. G. DOYARENKO (*Izv. Moskov. Selsk. Khoz. Inst.* [*Ann. Inst. Agron. Moscou*], *15* (*1909*), *No. 1*, *pp. 74–88*, *figs. 8*).—In the series of experiments reported it was found as a rule that orthoclase was a very poor source of potash for plants, while potash mica gave better results. The best results, however, were obtained with a stone containing nepheline, with which one-third of the potash present was assimilated by plants. The results with orthoclase varied very slightly from those obtained in cultures without potash. On the other hand, the results with potash mica and nepheline stone were relatively good, though decidedly poorer than those obtained with the normal culture containing potassium chlorid.

These results were obtained in cultures in which the nitrogen was supplied in the form of nitrate, but no better results were obtained when ammonium salts were used, the observations differing in this respect from those in the case of raw phosphates.

Sand cultures with raw phosphates, I. S. SHULOV (*Izv. Moskov. Selsk. Khoz. Inst.* [*Ann. Inst. Agron. Moscou*], *15* (*1909*), *No. 1*, *pp. 32–73*, *figs. 19*).—These experiments showed that while ammonium salts exerted a marked solvent action on raw phosphates, potassium chlorid showed no such action, although the conditions were apparently very favorable for the purpose. The substitution of air nitrogen (calcium nitrate) for nitrate nitrogen increased the assimilation of the phosphoric acid of raw phosphates by peas, although it might have been assumed that the marked physiological alkalinity of the calcium nitrate would depress assimilation.

Raw phosphates of different origin showed decided variations in assimilability by certain plants, particularly buckwheat, lupines, and peas, these crops showing a higher degree of assimilation of the raw phosphate and responding more readily to increasing applications. Experiments with tricalcium phosphate showed an unfavorable effect upon assimilability as a result of heating. Extraction of ashes in many cases increased the assimilability of the phosphoric acid, this being especially true in the case of straw ash.

In tests of culture solutions it was found that a normal culture containing monocalcium phosphate and ammonium nitrate gave better results than the ordinary combination of monopotassium phosphate and calcium nitrate, and the latter gave better results than monopotassium phosphate and ammonium nitrate. It appears that the first combination is more likely to give a neutral reaction

of the solution, while the second lowers the alkalinity and the third gives an acid reaction.

The action of podzol soils on raw phosphates, A. G. DOYARENKO (*Izv. Moskov. Selsk. Khoz. Inst.* [*Ann. Inst. Agron. Moscou*], *15* (*1909*), *No. 2, pp. 224–229*).—In view of the fact that raw phosphates give good results as fertilizer on podzol soils, experiments were made to determine whether such soils exert any special action upon the solubility of the phosphates. The experiments, however, gave negative results since less phosphoric acid was dissolved by means of acetic acid from a mixture of soil and phosphate than from the two treated separately.

Phosphorus and humus in relation to Illinois soils, C. G. HOPKINS (*Ann. Rpt. Ill. Farmers' Inst., 13* (*1908*), *pp. 177–194*).—This article sets forth quite fully the author's well known views regarding the use of raw rock phosphate for the improvement of certain classes of Illinois soils.

Florida phosphates, A. VOGT (*Amer. Fert., 31* (*1909*), *No. 4, pp. 5–7*).—The origin, formation, and discovery of these phosphates are briefly discussed. The author claims to have discovered the phosphate deposits of Florida in 1888.

Russian superphosphates (*Chem. Trade Jour., 45* (*1909*), *No. 1157, p. 80*).—A brief note is given upon an inquiry by the Russian agricultural department into the possibility of cheapening the supply of phosphatic fertilizers and on extensive cooperative fertilizer experiments which have been undertaken by the department. A congress has been called to consider the question.

The reduction of bones by alkalis, K. D. SOKOLOV (*Izv. Moskov. Selsk. Khoz. Inst.* [*Ann. Inst. Agron. Moscou*], *15* (*1909*), *No. 2, pp. 219–223*).—By treating coarsely ground bones with various alkaline mixtures, either heating for 7 hours or treating in composts, it was found that mixtures of ashes and calcium hydroxid or of alkali carbonate and calcium hydroxid under all conditions tested increased to a marked extent the citrate solubility of the phosphoric acid (77.7 to 87 per cent of the total phosphoric acid).

The amount of free lime and the composition of the soluble phosphates in basic slag, C. G. T. MORISON (*Contrib. Lab. Rothamsted Expt. Sta., 1909, pp. 161–170, figs. 2; reprinted from Jour. Agr. Sci., 3* (*1909*), *No. 2, pp. 161–170, figs. 2*).—By shaking the slag for a considerable time with distilled water free from carbon dioxid and titrating with standard acid, using phenolphthalein as an indicator, it was found that the free lime present varied from about 5 to 6 per cent.

Further chemical studies of the slag gave results confirming Kroll's conclusion "that the principal constituent of basic slag is a compound hitherto unknown, consisting of a silico-phosphate of lime and ferrous iron." The formula indicated by the analytical data is $(CaO)_5FeO. P_2O_5SiO_2$.

"The absence of crystals of tetracalcium phosphate, which were undoubtedly obtained from basic slag by earlier observers, and the low percentages of free lime now found to be present in the slag, may be correlated with the increased percentage of phosphoric acid in slags of modern manufacture, less lime being nowadays employed in the dephosphorization process than formerly."

On the behavior of aluminum and iron phosphate, D. N. PRIANISHNIKOV (*Izv. Moskov. Selsk. Khoz. Inst.* [*Ann. Inst. Agron. Moscou*], *15* (*1909*), *No. 1, pp. 16–23, figs. 4*).—In the pot experiments with oats, barley, and buckwheat reported, the addition of calcium carbonate always exerted a depressing action on the assimilability of the phosphoric acid of these phosphates. In laboratory experiments it was found that the addition of calcium carbonate reduced the amount of phosphoric acid dissolved from these phosphates by water alone or water charged with carbon dioxid.

The influence of calcium carbonate on the action of different calcium phosphates, D. N. PRIANISHNIKOV (*Izv. Moskov. Selsk. Khoz. Inst.* [*Ann. Inst. Agron. Moscou*], *15* (*1909*), *No. 1, pp. 1–15, figs. 10*).—Pot experiments with different crops, using varying amounts of calcium carbonate in combination with the different phosphates, showed that the action of Thomas slag, monopotassium phosphate, and monocalcium phosphate was almost unaffected by the addition of calcium carbonate. With raw phosphate, bone meal, and tricalcium phosphate the depressing action of the calcium carbonate was very marked. Chemical analysis as well as the yields showed that the assimilation of phosphoric acid was very greatly influenced in many cases. The results described were obtained with Gramineæ and buckwheat, but when plants such as lupines and flax, which are antagonistic to lime, are used, the action of the calcium carbonate was always more or less depressive.

Lime experiments, D. N. PRIANISHNIKOV (*Izv. Moskov. Selsk. Khoz. Inst.* [*Ann. Inst. Agron. Moscou*], *15* (*1909*), *No. 1, pp. 109–115, figs. 2*).—In experiments to determine the influence of increasing amounts of calcium carbonate on different soils and plants it was observed that liming was frequently injurious to Gramineæ when the amount of calcium carbonate added was more than 0.25 per cent of the weight of the soil. When less than this amount was used the results were very favorable. It was observed also that lupines, which are generally considered antagonistic to lime, responded favorably to liming in small amounts on certain kinds of soils. The limits of favorable action of the lime for lupines on such soils were, however, lower than for Gramineæ.

The definition of marl, C. A. STEWART (*Econ. Geol., 4* (*1909*), *No. 5, pp. 485–489*).—The various uses which have been made of the term marl are given and the author concludes that in his opinion the term "should be employed in its original sense—as any rock that is valuable as a natural fertilizer (with the exception of the phosphate rocks and such well-defined minerals as gypsum which seem to be separated in general usage)."

The agricultural utilization of the town garbage in Breslau (*Gesundheit, 1909, p. 152; abs. in Wasser u. Abwasser, 1* (*1909*), *No. 13, p. 551*).—The main features of the city regulations regarding the handling of garbage are given.

Fertilizers, C. S. CATHCART (*New Jersey Stas. Rpt. 1908, pp. 7–13*).—This is a summary account of inspection of fertilizers in New Jersey in 1908, the details of which have been given in bulletins of the station (E. S. R., 20, pp. 625, 926).

A table is given which shows the wholesale price in New York in 1907 of nitrogen, phosphoric acid, and potash in various fertilizing materials.

During 1908, 735 samples of fertilizing materials were examined. "Every brand examined this year, with two exceptions, was accompanied by a guaranty as required by law. A large number, about one-third, of these guaranties, however, were defective in respect to phosphoric acid, either the total or available phosphoric acid alone being given.

"The quality of the fertilizers was excellent, with but few exceptions. Water-soluble nitrogen was present in 325 samples, 153 of which contained nitrogen in the form of nitrates, 243 in the form of ammonia salts, while in 73 brands both of these soluble forms were present. Thirty-two brands contained the potash in form of sulphate.

"There were 276 failures to reach the guaranty. These failures were distributed among 236 brands, 200 being deficient in one element, 32 in two elements, and 4 brands in all three elements."

Fertilizers as sold, 1909, A. MCGILL (*Lab. Inland Rev. Dept. Canada Bul. 186, pp. 13*).—This bulletin reports the results of analysis and valuation of 66 samples of fertilizers collected during May and June, 1909. Of this number 38 samples were found to be up to the guaranteed values.

Fertilizers in South Australia (*Agr. Gaz. N. S. Wales, 20 (1909), No. 9, p. 806*).—This is a brief note calling attention to the rapid extension of the use of fertilizers in South Australia. The amount of fertilizers used has increased from 3,000 tons on 60,000 acres in 1897 to 76,500 tons on 2,100,000 acres in 1909.

AGRICULTURAL BOTANY.

The rôle and function of mineral salts in the life of the plant, N. T. Déléano (*[Trav.] Inst. Bot. Univ. Genève, 8. ser., 1908, Nos. 2, pp. 33, dgms. 13; 3, pp. 35–61, dgms. 9*).—In a previous communication (E. S. R., 20, p. 27) the author has shown the negative migration of mineral matter in annual plants. He has continued and extended his observations to include biennial plants and the leaves and fruits of perennials.

In the biennial plant, which is represented by the carrot, there was a migration of mineral matter from the stem and leaves to the root toward the end of the first year. There was little increase in the ash content of the root during the second year, but a very decided one in the aerial portions of the plant, from which pronounced negative migration took place later, the root in this case acting somewhat as a regulator.

A quantitative determination was made of the mineral and organic matter in the leaves and fruits of *Prunus insititia* at various stages of development. While the fruit is green the leaves and fruit are said to possess practically the same composition, but as the fruit begins to ripen the leaves develop more rapidly and the proportion of mineral salts that they contain is at the same time increased. After the fruit has ripened the leaves continue to develop and present a maximum content, which diminishes toward the end of their existence. At the end of the period of vegetation there is a decided decrease in the dry weight, due in part to the translocation of starch, but also to the loss of organic nitrogenous material, potash, and phosphoric acid.

The transfer of calcium and magnesium ions from plant cells, B. Niklewski (*Ber. Deut. Bot. Gesell., 27 (1909), No. 5, pp. 224–227; abs. in Jour. Chem. Soc. [London], 96 (1909), No. 562, II, pp. 694, 695*).—A study was made of experiments reported by Hansteen in which it was shown that wheat grown in water cultures and supplied with calcium salts made normal growth, but that when the cultures contained potassium, sodium, or magnesium salts alone, toxic symptoms were observed. By the addition of a small quantity of calcium salt the poisonous property seemed to be removed and the plant restored to normal growth.

The author believes that an explanation of this phenomenon is that there was a moving out of calcium and magnesium ions from the cells into the culture solution and that the injurious effect was counterbalanced when the calcium ions in the solution reached a certain concentration.

The biology of chlorophylls, E. Stahl (*Zur Biologie des Chlorophylls. Jena, 1909, pp. V+154, pl. 1, figs. 4*).—Studies are given of chlorophyll in relation to light, leaf colors, yellowing, and etiolation. In the various chapters the author discusses the influence of atmosphere on the absorption of light by chlorophyll, the relation between light absorption and carbon dioxid assimilation, the biological significance of chlorophyll absorption, the effect of light of different colors on assimilation, regulatory apparatus of plants for light, biology of the nongreen algæ, autumn coloring of leaves, and the biological significance of yellowing and etiolation.

A study of chlorophyll bodies, J. d'Arbaumont (*Ann. Sci. Nat. Bot., 9. ser., 9 (1909), No. 4–5, pp. 197–229*).—On the basis of a study of a large number of Angiosperms and Gymnosperms the author divides chlorophyll bodies into two

groups. One of these is localized in special cells, and the bodies are more or less lenticular or spherical and of uniform contour. These are the chlorophyll grains or chloroplasts of literature. The second form he calls pseudo-chloroplasts and recognizes four forms. These are more generally distributed than the chloroplasts, occurring in leaves, stems, etc., and are characterized by their irregular shape.

The chlorophyll bodies of the first group are held to be morphologically superior to the others, but they are subordinate to the pseudo-chloroplasts in their rôle in the assimilation of carbon dioxid gas. The second group of chlorophyll bodies can be formed with or without starch, and during the summer season they appear to be quite indifferent to starch formation.

Synthesis and chlorophyll assimilation, J. Lefèvre (*Rev. Gén. Bot., 21 (1909), No. 242, pp. 68–75*).—In a previous publication (E. S. R., 18, p. 26) the author showed the possibility of growing plants in artificial media containing amids with the total exclusion of carbon dioxid. These experiments have been extended, cress, nasturtiums, and other plants being grown in light and darkness in media containing various amids.

It was found that green plants deprived of carbon dioxid but grown in amid media are able to develop in the light without the liberation of any oxygen, hence without any chlorophyll assimilation. On the contrary, if the plants are deprived of both carbon dioxid and organic material, or placed in the dark and supplied with amids, there is no development and the plants quickly die.

There appears to be a function of plants which is due to chlorophyll that is entirely separate from the ordinary chlorophyll assimilation. This function not only continues but completes assimilation by the plant when in contact with air and obtaining its nutrition from the soil, and it suffices to bring about the development of the plant through synthesis when deprived of carbon dioxid but furnished with the necessary amids. This function the author calls chlorophyll synthesis.

Influence of radium radiations on the chlorophyll and respiratory functions of plants, A. Hébert and A. Kling (*Compt. Rend. Acad. Sci. [Paris], 149 (1909), No. 3, pp. 230–232; abs. in Jour. Chem. Soc. [London], 96 (1909), No. 563, II, p. 753*).—According to the investigations reported, radium radiations had no appreciable influence on the composition of the atmosphere in which plants were growing. Chlorophyll was found not to exercise its functions under the influence of the radiation when light was excluded. The cells of the plants, however, were found to undergo alteration, and respiration and assimilation were considerably diminished in the case of leaves which had been exposed to the radiation before being placed in daylight. The ratio between respired oxygen and carbon dioxid assimilated was not affected by preliminary exposure to radium.

The relation between carbohydrates and the formation of anthocyanin, R. Combes (*Ann. Sci. Nat. Bot., 9. ser., 9 (1909), No. 4–5, pp. 275–303*).—A study was made of leaves that are characterized by a reddish color when grown in intense light, those that assume red tints in autumn, and those that become red following the annular decortication of the stems, in order to determine the relation between the formation of carbohydrates and anthocyanin. Comparisons were made with normal green leaves, and the sugars, glucosids, dextrins, starches, and cellulose were determined.

The results show that the red color in leaves is associated with an increase of carbohydrates. The author claims that anthocyanin, which is a glucosid, is not formed from preexisting glucosids but constitutes a considerable portion of the increased glucosids found in the plant. In a similar way it is not derived

from existing chromogens but is the result of an increased content of the more important carbohydrates. With the increase of sugars and the acceleration of oxidation, there is a decided increase in the glucosids, and a considerable portion of this increase is anthocyanin.

Oxidases and peroxidiastases, D. Brocq-Rousseu and E. Gain (*Rev. Gén. Bot., 21 (1909), No. 242, pp. 55–62, fig. 1*).—In previous publications (E. S. R., 20, p. 130) the authors have shown the wide distribution of peroxidase in seeds and also the duration of that enzym in old seeds, and the present note gives an account of investigations to obtain oxidase from the seeds of morning-glory. Oxidase is known to be very active in these seeds, but all attempts to isolate it failed; in every case the precipitate gave a reaction of peroxidase without any trace of oxidase. This raised the question of the relationship between the two diastases.

The occurrence of urease in higher plants, T. Takeuchi (*Jour. Col. Agr. Imp. Univ. Tokyo, 1 (1909), No. 1, pp. 1–14*).—In studying the enzyms of some of the higher plants, the author discovered in the resting seeds and seedlings of the soy bean a powerful urease, which demonstrates that this substance exists not only in lower organisms but in higher plants as well.

An experimental study of acclimatization, J. W. Harshberger (*Proc. Acad. Nat. Sci. Phila., 61 (1909), pt. 1, pp. 57–110*).—A study has been made of the sequence of the opening of buds of various species of plants.

The experiments were conducted with a number of different varieties of twigs obtained near Philadelphia and their normal development compared with that induced by various chemicals. The following spring twigs of 26 species and varieties of perennial plants were obtained from 12 different localities and the effect of the chemicals in altering the normal sequence of bud development was investigated. In general the sequence of development was maintained, showing that acclimatization had occurred, and the differences in the time of bud development illustrated the extent to which the variations had become established.

Studies in symbiosis, N. Bernard (*Ann. Sci. Nat. Bot., 9. ser., 9 (1909), Nos. 1, pp. 1–64, figs. 12; 2–3, pp. 65–192, pls. 4, figs. 16; 4–5, pp. 193–196*).—In a previous paper (E. S. R., 14, p. 635), the author has shown the dependence of many species of orchids on fungi for their germination and subsequent development. In the present article a detailed account is given of the interrelationship of the two organisms. In many cases species of Rhizoctonia appear to be symbiotically associated with orchids, although it has been found possible in artificial media to secure germination by increasing the concentration, the result of this being the same as that produced by the fungus. Other conditions equivalent to symbiosis are described.

A bibliography of mycological literature, G. Lindau and P. Sydow (*Thesaurus litteraturæ mycologicæ et lichenologicæ ratione habita præcipue omium quæ adhuc scripta sunt de mycologia applicata. Leipsic, 1909, vol. 2, pt. 2, pp. 321–808*).—This is the conclusion of the work previously noted (E. S. R., 21, p. 33), the total number of papers represented being 29,750.

FIELD CROPS.

Dry farming: Its principles and practice, W. Macdonald (*New York, 1909, pp. XIV+290, pls. 32*).—This work devotes a chapter each to the following topics: History of dry farming, some points in practice, the conservation of soil moisture, rainfall and evaporation, the problem of tillage, the Campbell system, dry-farming zones, dry-land crops, the traction engine in dry farming, and dry-land experiments.

Seed time and harvest time of crops grown in Bengal (*Calcutta: Dept. Agr. Bengal, 1908, pp. II+27*).—Tables are given showing the time of seeding and harvesting cereal, leguminous, vegetable, spice, oil, drug, dye, fiber, and miscellaneous crops in the different districts of Bengal.

Notes on some introduced plants of southern California, I, S. B. PARISH (*Muhlenbergia, 5 (1909), No. 8, pp. 109–115*).—This article notes the introduction during or prior to 1888 of *Bromus rubens* and *B. maximus* var. *gussoni* into the San Bernardino Valley. The introduction was through the agency of foul seed grain. Both varieties spread rapidly and are now the most widespread and abundant grasses of the region. Either one established excludes the other or any other form of vegetation.

Soft chess, mainly *B. hordeaceus* var. *intermedius* has spread rapidly since 1895 as far east along the Southern Pacific Railway as Rochester. It is less objectionable than the 2 bromes, but of little forage value, although recommended for thin sandy land that will not support better grasses.

Other bromes noted are *B. madritensis*, introduced about 1887, *B. arenarius*, rarely found, and *B. secalinus* found in southern California. *Setaria glauca* is reported as persisting a few years when introduced, but disappearing when overgrazed, without tendency to spread in any case. Rare stools of timothy and orchard grass are reported as mere waifs. *Cenchrus tribuloides* is well established and destined to become a serious pest. Johnson grass (*Sorghum halepense*) flourishes by the roadsides, in waste places, and in alfalfa and cultivated lands but is not troublesome. *Lamarckia aurea* is common but recommended only for its beauty. *Gastridium lendigerum* is common only in the coastal region but may extend inland as a few plants were found in San Bernardino in 1907.

Report of the animal husbandman, F. C. MINKLER (*New Jersey Stas. Rpt. 1908, pp. 25–41*).—A brief account is given of the work on the college farm for the year.

The more successful soiling crops with their yield per acre in tons and their cost per ton for growing and harvesting, were as follows: Rye, 6.38 tons at $1.02 per ton; wheat, 5.3 tons at 79 cts. per ton; oats and peas, 8.79 tons at $1.41 per ton; Japanese barnyard millet, 7.05 tons at $2.59 per ton; barnyard millet with silage, 6.95 tons at $1.85 per ton; Thoroughbred White Flint corn, 10.5 tons at $1.32 per ton; rowen (green), 78 cts. per ton; cowpeas, 4 tons at $2.94 per ton; and cowpeas and Kafir corn, 2.75 tons at $4.07. Oats and Canada field peas were regarded as the most successful forage crop except alfalfa.

Among the field crops, mixed hay produced an average yield per acre of 3.77 tons, 4 cuttings of alfalfa, 2.02 tons, and oats and peas, 2.82 tons of cured hay.

On seed-corn plats Reid Yellow Dent produced at the rate of 70 bu. per acre, Improved Leaming 68.57 bu., Silver King 71.8 bu., and Boone County White 84.6 bu. on the tasseled rows. The detasseled rows produced yields from 3 pk. to 4 bu. in excess of these figures, except for Reid Yellow Dent, for which the two yields were exactly equal.

In a field test of varieties, Boone County White yielded 49.4 bu. per acre, white corn from Monmouth County 53.1 bu., yellow corn from Gloucester County 26.2 bu., and yellow corn from Middlesex County 19.9 bu.

Twenty-three acres of corn after rye, planted on June 1, with cowpeas drilled in at the first cultivation, produced 214.8 tons of silage, at a total cost per ton of $3.51 in the silo.

In a fertilizer experiment with silage corn, 8.86 tons per acre were produced on plats fertilized with 300 lbs. basic slag, 200 lbs. tankage, and 100 lbs. muriate of potash per acre. On plats fertilized with 120 lbs. of tankage, 100 lbs. ground bone, 250 lbs. acid phosphate, and 100 lbs. of muriate of

potash per acre, 8.4 tons were produced, and 8.5 tons on plats fertilized with 200 lbs. of Peruvian guano, 100 lbs. tankage, 200 lbs. acid phosphate, and 100 lbs. of muriate of potash per acre.

Irrigation of alfalfa, S. FORTIER (*U. S. Dept. Agr., Farmers' Bul. 373, pp. 48, figs. 32*).—This discusses the adaptation of alfalfa to varying conditions, the removal of the native vegetation from arid land, its preparation for irrigation, the border, check, flooding, and furrow methods of irrigation, and the establishment and maintenance of ditches. Subirrigation, winter irrigation, and the winterkilling of alfalfa are also discussed. Directions are given for seeding, and the effects of ground water, silt, and disking discussed. The profits of growing alfalfa in various districts are tabulated.

Barley cultivation in Ireland, A. MCMULLEN (*1909, pp. 130*).—This pamphlet summarizes at length the results of experiments with barley together with other observations made on the crop. General notes on barley cultivation are given, manuring and soil analysis are discussed, the classification of barley varieties is presented, and the results secured in barley experiments in Ireland are reviewed.

The barley experiments conducted in Ireland for 8 years indicate that Archer is the most profitable of the so-called narrow-eared barleys. The pure selected strains of this variety, known as Danish Archer and single-ear Archer, gave the best results. Goldthorpe was the most profitable of the wide-eared barleys, and its most profitable strain was the pure-selected seed raised by cultivation from a single ear. It is considered that on most farms it would pay better to grow Archer than Goldthorpe.

A pure selected seed raised by cultivation from a single ear resulted in a greater evenness of growth and a smaller amount of infertility in the ear as compared with ordinary commercial seed. It is stated that barley can not be profitably grown on the same land for more than 3 or 4 years in succession.

Twenty-three years' field trials with varieties of six-rowed barley, M. L. MORTENSEN and K. HANSEN (*Tidsskr. Landbr. Planteavl, 16 (1909), No. 2, pp. 194–242*).—Experiments with 19 different varieties of barley begun in 1886, and since then in progress at 5 Danish experiment stations, are reported. The origin and general characteristics of the different varieties are described and data relating to yields of grain and straw, bushel weight, maturity, and the strength of the straw are included.

Tystofte Korsbyg and Frederiksen Six-rowed gave the heaviest average yields of grain. Tystofte Korsbyg gave the highest yields of straw and ripened latest, while the other variety gave the lowest yield of straw and ripened earliest.

Results of experiments with domestic and foreign barleys at the Jubilee Exposition, 1908, O. NEUMANN (*Wchnschr. Brau., 26 (1909), No. 39, pp. 465–469*).—The principal points determined were that the influence of the nitrogen content of the barley on the malt and extract production is practically the same in barleys of different countries; that the weight of the grain ceases to be a factor in determining the value when it is more than 42 gm. per thousand grains; and that heavy barleys which germinate vigorously do not require a longer time for their dissolution than relatively thinner and lighter barleys.

Report of the society for the encouragement of the culture of brewing barley in France, A. KREISS, P. PETIT, and BLARINGHEM (*Société d'Encouragement de la Culture des Orges de Brasserie en France. Paris, 1908, pp. 28, pls. 4*).—This report describes the situation of the brewing barley industry in France and discusses the results of numerous experiments conducted with brewing barley throughout the country.

Caravonica cotton (*Ztschr. Farb. Indus., 8 (1909), No. 19, pp. 295–299, figs. 10*).—An article comparing different varieties of cotton but giving special attention to the Caravonica varieties of which actual lint and manufactured yarn are given for illustrative purposes. The observations on which the article is based were made in the German African colonies.

The results on the flax experiment farms of Silesia in 1908 (*Ztschr. Landw. Kammer Schlesien, 13 (1909), No. 40, pp. 1197–1203*).—The ground for these experiments was plowed deeply in fall or in winter and fertilized at the rate of 600 kg. of kainit per hectare (about 534 lbs. per acre) and in the spring before seeding with 400 kg. of superphosphate. In addition to this the land received 100 kg. per hectare of either nitrate of soda or sulphate of ammonia.

The yields were in nearly all cases very largely increased through the use of nitrogenous fertilizers, and these were much more effective on the level low-lands than on mountain soils. Sulphate of ammonia was apparently more effective in increasing the yield of fiber flax than nitrate of soda, but with reference to seed production the results were practically the same.

The so-called white wild oats and what they are, N. CRIDDLE (*Ottawa Nat., 23 (1909), No. 7, pp. 127, 128*).—The white wild oats, which resembles in its seed form the wild species *Avena fatua*, is regarded by the author as a sport or a probable form of atavism active in all or nearly all varieties of both types, *A. sativa* and *A. orientalis*. It is stated that these so-called white wild oats closely resemble in the seed form the variety from which they were selected. This supposed wild oat, however, is always awned with a strong twisted black and white awn and has also the horseshoe shaped base of *A. fatua*. "Thus it resembles in color, shape, and size the variety from which it originated and in other respects the wild species, excepting that the basal hairs are absent or nearly so." Specimens of these white wild oats were found in Banner, New Market, Abundance, Storm King, and Bumper King. The greater number of specimens was found in New Market and Storm King.

The field pea in Wisconsin, R. A. MOORE and E. J. DELWICHE (*Wisconsin Sta. Bul. 178, pp. 3–12, figs. 4*).—This bulletin presents notes on the adaptability of field and canning peas to Wisconsin conditions with directions as to planting, cultivation, rotation, harvesting, and thrashing. The value of peas as food and as soil improvers is discussed.

A variety test begun in 1908 on a heavy red clay soil at Ashland without the addition of any fertilizers gave for plats ranging in size from 1/80 to 7/10 acre the following yields per acre: Golden Vine 18.66 bu., Potter 23.66 bu., White Marrowfat 20.33 bu., Bruce Blue Prussian 16.66 bu., Canadian Beauty 23 bu., Early Britain 21 bu., Scotch 20 bu., Green 21.33 bu., and Common Yellow 24.60 bu. These results are regarded as confirming the value of such soil for peas.

Some seed potato questions in 1909, T. C. JOHNSON (*Virginia Truck Sta. Bul. 3, pp. 51–55*).—A preliminary report on this subject has already been noted (E. S. R., 21, p. 430).

The present bulletin describes the method of producing seed potatoes under Maine conditions for the purpose of arriving at a possible explanation of the failure in tidewater Virginia, in 1909, of the potato crop grown from Maine seed. No definite conclusions, however, are reached. In recent years, Irish Cobbler seed potatoes from Maine and certain other States have been used with good results until 1909, when losses from rotting of the crop produced were sustained. It is stated that the custom of harvesting the crop while immature, together with climatic conditions in Maine, tends to reduce the danger from late blight (*Phytophthora infestans*) to the minimum. Frost in Maine, early in September, 1909, checked this disease.

A disease locally known as blackleg, which made its appearance at the same time, is believed to have been introduced into various localities by means of the seed. It was found that in many cases the Virginia fields of Irish Cobbler were mixed with other varieties, mainly Green Mountain.

Potato culture in northern Wisconsin, E. P. Sandsten and E. J. Delwiche (*Wisconsin Sta. Bul. 177, pp. 3–17, fig. 1*).—In continuation of work previously noted (E. S. R., 19, p. 131), experiments with potatoes indicated the need of adding nitrogen and humus to the sandy soils of northern Wisconsin. For this purpose dairy farming combined with potato raising is recommended as is also the application of barnyard manure. A 3-year rotation recommended is clover, potatoes, and barley, oats or rye. Good results have been obtained by allowing the clover to grow until June 1 following the year of seeding, then turning it under before planting to potatoes. When the clover crop has occupied the ground for a long period and has been cut for hay, fall plowing has given the best results.

Planting between May 25 and June 5 in rows 36 to 40 in. apart and with hills 15 in. apart has been found to give the best results. At Iron River, potatoes planted 4 in. deep yielded at a rate of 16 bu. and 12 lbs. higher than those planted 6 in. deep and 38 bu. and 12 lbs. higher than those planted 8 in. deep. Level cultivation succeeded best on sandy soils but hilling was necessary on heavy clay soils to provide drainage and prevent sun-burning.

Ten varieties of potatoes tested at Iron River Substation in 1908, ranged in yield per acre from 56 to 172 bu. The leading varieties and their yields per acre were as follows: Carmen No. 3 172 bu., Burbank 166 bu., Noroton Beauty 156 bu., and Early Rose 153 bu. At the Ashland Substation, these same varieties ranged in yield per acre from 37 to 107 bu., the leading varieties and their yields being Stray Beauty 107 bu., Burbank and Rural New Yorker No. 2 97 bu., and Carmen No. 3 87 bu.

The influence of carbon disulphid on the development of the sugar beet (*Gaz. Cukrownicza, 1909, p. 479; abs. in Wchnschr. Cent. Ver. Rübenz. Indus.* [*Vienna*], *47* (*1909*), *No. 21, p. 318*).—Experiments conducted in Poland to determine the influence of carbon disulphid on the growth of the sugar beet are here reported. The carbon disulphid was placed in holes 20 cm. deep which were made between 2 rows of beets at intervals of 35 cm. The quantity used per hole was about 6.5 gm.

The average weight per beet in each check experiment was 291 gm. as compared with 309 gm. for the rows treated with the carbon disulphid. The sugar content for the check rows was 16.79 per cent and in the treated rows 16.95 per cent. The treated rows showed an increase in yield of 4,070 kg. per hectare (about 3,622 lbs. per acre), but this increase was insufficient to pay for the carbon disulphid used. It is, therefore, concluded that carbon disulphid can be used with profit only on beet lands infested with nematodes.

Beet crop estimator, C. E. Bensel (*Amer. Sugar Indus. and Beet Sugar Gaz., 11* (*1909*), *No. 10, p. 428, fig. 1*).—An instrument used in estimating the tonnage of sugar beets is described and directions for its use are given.

Annual report on the investigations and progress of the manufacture of sugar, J. Bock (*Jahresber. Zuckerfabrik.* [*Stammer*], *48* (*1908*), *pp. XII+287, figs. 12, charts 5*).—This publication contains reviews of books and articles relating to the agricultural, mechanical, chemical, and statistical phases of the beet sugar industry in the different beet growing countries of the world.

Work at the tobacco stations, E. H. Mathewson et al. (*Virginia Sta. Bul. 183, pp. 4–16, figs. 9*).—This has been noted from another source (E. S. R., 21, p. 433).

Reports of the Deli Experiment Station at Medan, J. G. C. VRIENS (*Meded. Deli-Proefstat. Medan, 3 (1909), No. 9, pp. 283-393*).—Cooperative fertilizer experiments with tobacco carried on in different localities for several years in succession are reported.

Among other results it was found that light applications of ammonium sulphate at the time of transplanting had a very beneficial effect. Tobacco ash proved to be a very efficient potash fertilizer. Nitrate of potash was not always effective as a source of nitrogen but as a source of potash, especially as a factor in the improvement of the burning quality, it gave good results.

Supplement to "The Best Wheats," P. DE VILMORIN (*Supplément aux Meilleurs Blés. Paris, 1908, pp. II+58, pls. 27*).—This book is a supplement to a previous work entitled Les Meilleurs Blés, by Henry de Vilmorin. A classification is given of all the varieties described in the 2 volumes. Brief notes on the description and culture of the principal varieties of spring and winter wheats are presented and the heads and grain of each variety are figured.

[Culture and methods of breeding wheat and oats and variety tests of wheat, oats, and rye], B. W. KILGORE, J. L. BURGESS, and F. T. MEACHAM (*Bul. N. C. Dept. Agr., 30 (1909), No. 8, pp. 35*).—Data relating to the history and statistics of wheat in the United States are presented and the adaptation of wheat to cultivation in North Carolina outlined in so broad a way as to include general directions for all small grains. Rotations and fertilizers are suggested for the various soils and sections of the State.

The wheat tests were chiefly to determine the varieties best suited to the soils and climate of North Carolina. The Golden Chaff, Fanta Ray, and Fish-headed produced the highest yields in 1906. Improved Amber, Bearded Fulcaster, Golden Chaff, and Ultra were most satisfactory in 1907, while Bearded Fulcaster, Gurnis, and Red Wonder stood highest in 1908. Of 5 varieties that have been tested during a period of 5 years the smooth-headed variety Golden Chaff yielded the highest amount of grain and stood second in yield of straw. It is well adapted to the red loam soils of the Piedmont section. During the same period Bearded Fulcaster stood second in yield of grain and first in yield of straw. No material difference has been observed in yield between the bearded and the smooth varieties of wheat.

In the work with oats the Red, Appler, and Burt have proved the highest yielders. Fall sowing invariably outyielded spring sowing of the same variety and matured about the same time. Full-sown Appler oats yielded 15.38 bu. per acre while the Red yielded 20.6 bu. A comparative test of Culberson oats planted in drills and in open furrows resulted in an increase of 2.7 bu. per acre in favor of the open-furrow method.

Three varieties of rye ranked as follows: Georgia, with a yield of 31.25 bu. per acre, Albruzzen No. 4343, with a yield of 16.66 bu., and Petkus No. 5058, with a yield of 10.66 bu.

Morphological changes in grain kernels under the influence of climatic conditions, J. RAUM (*Zur Kenntnis der morphologischen Veränderungen der Getreidekörner unter dem Einflusse klimatischer Verhältnisse. Diss. K. Tech. Hochschule München, 1906, pp. 137, pls. 6*).—The experimental work forming the basis of this thesis consisted of determinations of the weight, length, thickness, and width of grains of oats, barley, wheat, and rye. The author's conclusions are briefly summarized.

Completely awnless varieties of oats were not found. The existence of awns is considered a very important character in oats, although influenced by climatic conditions and particularly by the rainfall. The weight of the grain (hull and kernel) increased approximately 10 per cent with the presence of the awn.

The introduction of foreign varieties into Bavaria caused a marked reduction in the weight of the grain during the first year these varieties were grown under the new conditions. In later years variations in the weight of the grain were similar to those occurring in the standard sorts. Five years after their introduction, varieties related to the native sorts showed no difference in the grain weight, but the improved heavy grained North German varieties retained in part at least their characteristic heavy weight of the grain as long as the eighth year of their culture in Bavaria. A gradual approximation of the grain weight of the native oats, however, was apparent. The variation in the size of the grain was controlled in general by the amount of precipitation during the period the kernel was forming.

The weight of the hulls of the inner grains was from 5 to 10 per cent lower than the weight of the hulls of the outer grains. A difference sometimes amounting to 3 per cent was observed in the weight of the hulls of the awned and the awnless outer grains, those of the awned grains being the heavier. In most of the improved varieties examined, the hulls were not so heavy as in the common varieties. During the first 2 years the hull content in the highly-bred varieties varied in a manner similar to that in the native standard sorts, but in Fichtelgebirg oats the hull content increased considerably during the first and second year after its introduction at Weihenstephan. The hull content was not found to be a very constant variety character.

In studying the length of the grains it was observed that the inner grains were about 15 per cent shorter than the outer ones and the awnless outer grains about 5 per cent shorter than the awned. All introduced varieties grown at Weihenstephan lengthened their grains. In the common varieties this lengthening took place during the first and second years of their culture in the new environment, while the improved varieties followed in a measure the variations in the domestic sorts, attaining the greatest grain length in the same seasons. The yearly variation in the length of the grain was greater in the common than in the improved varieties. The variations in the length of the inner grains, as a rule, was not so marked as in the outer grains. The length of the grains was increased when the precipitation decreased during the time the grain was developed.

The inner grains of the spikelet were found to be shorter than the outer ones and the awnless outer grains shorter than the awned. During the first years of the experiment at Weihenstephan all introduced varieties showed an increase in the length of the hull and the kernel, the greater increase being made by the improved as compared with the common varieties. The maximum kernel length in the common varieties was attained during the second year of the test, while the highly-bred varieties varied in this particular very much like the standard varieties. The third year all varieties approached the standard variety in length of kernel. The variations in the length of the inner kernels of the spikelet were more marked than those of the inner grains and those of the outer kernels. Long grains were correlated with short kernels. The tip of the inner grains was in general absolutely and relatively smaller than the tip of the awnless outer grains, but in the awned grains it was larger than in the outer ones. The awned grains were in all cases thicker than the awnless but the difference was seldom more than 0.1 mm. The common varieties in general had thinner grains in the original seed and the later crops than the improved sorts. The thickness of the grain varied in the same manner as the length. With reference to the width it was found that grains in the common varieties were narrower than those of the improved varieties. This was true of the

original seed as well as of the grain produced later. This change or degeneration in the form of the grain in all varieties observed followed the same general rule for all dimensions.

The length of barley grains was not influenced as in the case of oats when the varieties were grown under changed climatic conditions. Newly introduced barleys during the first 2 years showed no change in quality and an increase in quantity, but with the third year they began to approach the standard variety in productivity. The length of the outer grains was observed to increase with the amount of precipitation at the time the grains were developing. The thickness varied practically the same as the length.

A study of wheat grains showed that moist as compared with dry seasons favor the production of a heavy and wide grain. No uniformity with reference to the influence of the change of climatic conditions on the length and thickness of the grain among the different varieties could be established.

The grain weight of rye was increased with the amount of rainfall but the relation was not so well defined as in the other crops. The length and thickness varied with the precipitation. During dry seasons the proportion of yellow grains was very high, while in wet seasons it was very low, but this characteristic was largely controlled by the variety.

The grain production of the world in 1909 (*Saaten, Dünger u. Futtermarkt, 1909, Nos. 38, pp. 988–995; 39, pp. 1024–1026; 41, pp. 1071–1080*).—The data regarding the production of the principal grain crops of the world, as published by the Hungarian Ministry of Agriculture, are presented by countries.

The eradication of farm weeds with iron sulphate, R. A. Moore and A. L. Stone (*Wisconsin Sta. Bul. 179, pp. 3–17, figs. 6*).—This is a continuation of work previously noted (E. S. R., 18, p. 1042).

In 1907, wild mustard was eradicated from fields of grain and other crops by the use of a solution of iron sulphate at the rate of 52 gal. per acre. The strength recommended is obtained by dissolving 100 lbs. of iron sulphate in water and diluting to 52 gal. The total cost of materials and application was $1.25 per acre.

The treatment proved efficient in the eradication of dandelions in lawns but less so in fields. Cocklebur, ragweed, daisies, wild lettuce, and several other common weeds were partially eradicated where tests were on mustard. Canada thistles and sow thistles were blackened but soon recovered even when sulphuric acid was added to the spray. Clean cultivation and rotation, however, killed the thistles, hemp being found to be an effective crop for the purpose.

HORTICULTURE.

Report of the botanist, B. D. Halsted, E. J. Owen, and N. D. Shore (*New Jersey Stas. Rpt. 1908, pp. 181–297, pls. 33*).—The breeding and selection work with truck crops (E. S. R., 19, p. 1039) was continued. In this work the production of new and improved varieties of vegetables has now been made secondary to the search for the rules underlying the improvement of plants.

The chief crops studied during the year were sweet corn, tomatoes, eggplants, beans, squashes, peas, peppers, and okra.

Notes are given on the newer and some of the more promising older crosses being tested, together with excerpts from the reports of the cooperative seed testers. Several crosses and hybrids were secured among ornamental plants, these including dianthus, nicotiana, pansy-violet and foxglove hybrids, and petunia and snapdragon crosses.

Among other studies with sweet corn, the test in selecting flinty seed was continued with the Malamo variety. The results again show the tendency of

flinty grains to reproduce their kind. The opinion is advanced that the tendency to produce starch is neither an ear characteristic, as is the color of the cob, nor a grain character, like the color of the grain, but takes an intermediate place between them. Malakosby white grains and pinkish grains were again tested. The white seed bred true, while of the pinkish seed, one-half of the resulting ears were pinkish and one-half were white. Iowa Silver Mine-Country Gentleman cross proved its superiority over ordinary sweet corns by making a good crop of ears under bad conditions, such as poor soil and a dry season.

When the Pride of Nishua, a large field variety of dent corn with reddish cob, was crossed with white cob varieties of sweet corn, the redness of cob of the former variety appeared to be transmitted as a dominant Mendelian character.

The effort to produce a tomato of marketable size with a long axis and a seedless, fleshy interior, was continued, and it is thought that the desired form of tomato is nearly realized. An attempt is also being made to eliminate the glands upon stem and foliage which yield the rank-smelling exudation common with ordinary kinds of tomato plants. Notes are given on the structure of the tomato flower cluster and the tomato calyx.

The work with eggplants is largely with hybrids of American and Chinese species, in the hope of developing a fruit of marketable size with a firm flesh that will neither shrivel nor decay in the short period which suffices for the destruction of the ordinary kinds. In addition to notes on the newer crosses, a study with tabular data is given of the characters of hybrid fruits.

The breeding work with beans was continued along lines previously noted.

The newer investigations with squashes have to do with studies of transmitted characters and correlations between characters. The study of crossing and continued selection to establish the cross has now been carried through 4 years of selection. A list of crosses is given showing the stages of variability throughout the 4 years. Biometric records are given of the parents and blends, both for winter and for summer squashes, together with observations drawn from the study of blends with their parents.

Similar character studies are reported for peas and peppers.

Report of the horticulturist, M. A. Blake and A. J. Farley (*New Jersey Stas. Rpt. 1908, pp. 43–53, 56–61, 63–86, pls. 13, dgms. 4*).—This includes a progress report on the peach investigations being conducted at High Bridge and Vineland, the long-continued fertilizer experiment with apples, strawberry tests, and asparagus breeding work (E. S. R., 19, p. 1037). Experiments with roses have been taken up in which two kinds of soils, nitrogen in five different forms, and various amounts of potash are being compared. An experiment was also begun to determine the proper proportions of sand and compost to add to red shale soil to secure the best returns in growing carnations.

The data and discussion relative to the experimental peach orchards have to do with the operations of pruning, fertilization, spraying, cover cropping, and general orchard management, including figures on the cost of the various operations, and on the annual growth made by the trees during the season of 1907. The total expense of the High Bridge orchard for the three seasons ending in 1908 has been 47 cts. per tree. During the past season the Vineland orchard was enlarged to over 1,000 trees. The details of the work in establishing this new section are given.

The various row systems of planting and training strawberries are discussed. A number of varieties of strawberries are being tested preliminary to further investigations. Data are given showing the names of the varieties, the dates of the first, the heaviest, and last pickings, and the total yield per row in grams.

In the fertilizer experiments with apples, started in 1896, the differences due to fertilization are becoming more prominent each year. The trees on the plat which has received no fertilizer are as large, in most cases, as corresponding trees on the plat which has received 500 lbs. of an even mixture of bone, muriate of potash, and acid phosphate. The trees on the plat on which 150 lbs. of nitrate of soda has been added to the above mixture have shown the largest amount of normal growth each year, the leaves being noticeably larger and a darker green. The fruit upon this plat, particularly that of certain varieties, matures a little later and averages slightly larger in nearly all cases. Tables are given showing the yields of apples secured from the various plats during the seasons of 1907–8.

Some progress has been made in the attempt to breed a rust-resistant asparagus. During the past season considerable rust developed upon the plants grown from seed obtained from various sources. Data are given showing the sources of the seed and the percentages of plants free from rust in October, 1908. This percentage varied from no plants in some cases up to 74.4 per cent. Imported seed in all cases produced quite rust-resistant plants. In all cases but one, seed selected from plants more or less free from rust produced plants more resistant to the disease.

Report of the fruit branch of the Department of Agriculture, Ontario, 1908, P. W. Hodgetts et al. (*Rpt. Fruit Branch Dept. Agr. Ontario, 1908, pp. 120, figs. 32*).—This is the first report of the recently organized fruit branch of the Ontario Department of Agriculture. It contains a general survey of the work of the fruit growers' and bee keepers' associations, the experimental fruit stations, spraying and nursery inspection, horticultural exhibitions, and cooperative associations, together with detail reports of the various fruit stations in Ontario relative to the varieties of fruits and vegetables being tested.

Other subjects reported are the extent of the vegetable industry in the Leamington district, the strawberry season for 1908, and cultural experiments with cranberries and onions.

The decay of cabbage in storage: Its cause and prevention, L. L. Harter (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 39, pp. 8*).—The results of investigations into the causes of the decay of cabbage in storage are reported and discussed under the following general headings: Factors contributing to decay, organisms concerned in decay, storage conditions and the proper construction of storage houses for preventing decay, and methods of storing cabbage.

The author finds that soft rot and leaf blight are the immediate causes of the decay of cabbage in storage. The organisms causing these decays gain access to the tissues of the leaves, both through wounds made by careless handling and by following up the fibro-vascular bundles which have been previously killed by black rot.

It is recommended that diseased or badly bruised cabbage should not be stored. Care should be taken to keep the cabbage dry and the storage house well ventilated, with the temperature at about the freezing point.

Cold storage for Iowa-grown apples, H. J. Eustace and S. A. Beach (*Iowa Sta. Bul. 108, pp. 394–414*).—Investigations in the cold storage of Iowa apples carried on in 1906–7 and in 1907–8, in cooperation with the Bureau of Plant Industry of this Department, are reported.

The principal points covered in this work are the relation between the handling of the fruit during the operations of picking, packing, and shipping, and its behavior in cold storage; a comparative test of a number of varieties to determine their behavior and value in cold storage, including, as far as practicable, fruit of the same varieties from different sections of the State; a com-

parative test of the influence of different styles of packages upon the keeping quality of the fruit when stored; and the influence of paper wrappers on the keeping qualities of fruit. The fruit was held in storage at a temperature of 34° F. in 1906–7, and at 33° F. the following season.

In storage, hard, firm, well-colored fruit keeps best. Northwestern Greenings of this type remained in prime condition a month longer than poorly colored, prematurely picked fruit. With the Patten, the scald was more conspicuous on the poorer colored lots. The difference was greater and more striking with the Wealthy than with any other varieties tested.

Fruit stored immediately after picking was in better condition, harder, firmer, and lasted longer after removal from storage, than lots of the same variety which were held in the orchard or in an open shed for two weeks, and then forwarded to the storage house. This was more noticeable with early ripening varieties when the delay in storage comes during warm fall weather. With varieties subject to scald, immediate storage tends to reduce and retard the development of that trouble to a marked degree.

With hard, late-ripening sorts, the advantage of wrapping in paper was not very apparent, while with tender varieties, the wrapper appears to extend the life of the fruit, preserving its natural brightness and lessening the amount of decay.

In the package trial, ordinary apple barrels, slat crates, and boxes holding 50 lbs., were compared. With the Northwestern Greening and Patten, the difference between the different packs was not marked. Wealthy kept in the best condition in boxes. The bruising was greater in the barrel and shriveling was greater in the slat crate than in either barrel or box. Data are given showing the rapidity of cooling of air and fruit in different styles of packages in cold-storage warehouses.

A summary is given of the orchard conditions in which the fruit used in the experiments was grown, together with a record of the varieties tested with reference to their keeping qualities in storage.

The results of the work as a whole confirmed earlier experiments conducted by the Bureau of Plant Industry along this line (E. S. R., 15, pp. 581).

Report on grape shipments, A. V. Stubenrauch (*Cal. Fruit Grower, 40* (*1909*), *No. 1115, pp. 1, 4*).—The storage and transportation experiments with table grapes being conducted in California by the Bureau of Plant Industry were continued during the season of 1909 with results similar to those previously noted (E. S. R., 20, p. 840). The report here given originally appeared in the *Lodi Sentinel.*

Data are given showing the percentages of decay in individual shipments of Tokay grapes on arrival in New York, and the average percentage of decay in all experimental shipments to New York during September and October, 1909. The average percentage of decay in the commercial packs upon arrival was 4.35 per cent, and in the carefully packed crates 0.9 per cent. The decay in the commercial lots increased to 7.42 per cent after 3 days exposure to market conditions, to 11.95 per cent at the end of 5 days, and to 15.78 per cent at the end of 7 days, while in the carefully packed crates the average decay at the end of 7 days was only 8.87 per cent. When the grapes were packed in boxes with ground cork only 4.08 per cent developed decay 7 days after arrival in market, and when redwood sawdust was used only 1.13 per cent.

Investigation was made of the percentages of decay resulting from injuries and the percentage of injured berries in a number of commercial packs obtained from different growers and held in California in an iced car for about two weeks, or the equivalent of a trip across the continent. At the end of the first day 9.02 per cent of the grapes were decayed and 12.82 per cent showed injuries.

At the end of the seventh day 29.62 per cent of the grapes were decayed and only 4.21 per cent of the injured fruit was free from decay.

One species of Botrytis was found to penetrate the unbroken skin of the berry after the grapes had been subject to a rainy period, the so-called "slip-skin" found after the rains being an early stage of the decay. The importance of culling these out before packing the fruit is emphasized.

The development of the leaf perimeter in relation to the yield of grapes, R. A. SACCÀ (*Lo Sviluppo del Perimetro Fogliare in Rapporto alla Produttività delle Viti. Piacenza, 1909, pp. 12, figs. 3*).—This is the report of an investigation conducted in the botanical laboratory of the Royal Agricultural High School of Portici.

A study of various species and varieties of grapes grown under similar conditions showed a correlation between yield and the amplitude of the angle formed by the median nerve and the lowest constant lateral nerve. In the data secured, the varieties as studied are grouped into 3 types according to whether the above-mentioned angle is obtuse, right, or acute. In general the yield decreases with the size of the angle. Eighteen obtuse-angled varieties had an average angle of 113° 26″, and an average production number of 24.95. Eight varieties showing an average angle of 90° 22′ 30″, gave an average production number of 10.105. Four varieties with an average angle of 69° 34′ 30″ showed an average production number of 6.38. The same correlation is noted in respect to the sugar content of the must, the acidity increasing as the angle decreases. Cultural conditions appear to influence the intensity of the skeleton network but not to affect the relative direction of the nerves.

Grape culture, A. KIRK (*London and Glasgow, 1909, pp. 75, pls. 19, figs. 36*).—A treatise on growing grapes under glass, based upon the author's experience and observations covering a long period of years. The text is well illustrated.

Handbook of grape growing and wine making, A. VON BABO and E. MACH (*Handbuch des Weinbaues und ker Kellerwirtschaft. Berlin, 1909, vol. 1, first half, 3. ed., pp. XX+623, figs. 276*).—The present edition of this old work has been considerably revised and enlarged with a view of including recent viticultural knowledge and practice. Volume 1 takes up the subject of grape growing.

The first half of this volume, which is here presented, deals in detail with the restoration of phylloxera-infested vineyards. The introduction deals briefly with the history of grape culture, and succeeding chapters discuss the organography, anatomy, and physiology of the grape, ampelography, under which the more important American and European varieties are considered, the selection of American stocks for the reconstruction of vineyards, breeding new varieties, propagation, grafting, nursery practices, climate in its relation to grape growing, soils, and the location of new vineyards. The concluding chapter discusses the care of young vineyards during the first five years after planting.

Protection of fruit trees from rodents, F. H. BALLOU (*Ohio Sta. Bul. 208, pp. 53–70, figs. 20*).—A popular discussion of the injury done to young fruit trees by bark-eating rodents, with illustrated instructions for using various protective coverings and healing girdled trees by bridge grafting.

Pecans, W. N. HUTT (*Bul. N. C. Dept. Agr., 30 (1909), No. 9, pp. 50, figs. 25*).—This bulletin is a preliminary report of the author's observations and researches during the last three years on the subject of pecan culture in North Carolina.

General consideration is given to the possibilities for commercial pecan growing and the geographic distribution and soil requirements of the pecan. Information follows relative to the establishment and culture of pecan groves, taking up the cost of trees, transplanting and planting operations, fertilizing,

the pecan bloom, selection of varieties, age of bearing, marketing, and the enemies of the pecan. Other phases discussed include instructions for cracking pecans, pecans as food, and the pecan as a shade tree.

The coconut, E. Prudhomme (*Le Cocotier. Paris: Govt., 1906, pp. 491, figs. 83*).—A treatise on the culture, trade, and commerce of coconuts in the principal countries of production. Part 1 treats in detail of the coconut relative to its botany, culture, and uses. Part 2 deals with the preparation of coconut products, including copra, oil, fiber, and various derivatives. Part 3 discusses the trade and commercial importance of various coconut products in different countries.

Official catalogue of sweet pea names, 1909, Jessie Cuthbertson (*Brentford, 1909, pp. 16*).—This catalogue has been prepared under the direction of the National Sweet Pea Society from the seed lists of the principal British and American raisers and distributers, with the view to preserving old names and titles, thus preventing future duplication of names.

FORESTRY.

Silvical leaflets (*U. S. Dept. Agr., Forest Serv. Silv. Leaflets 46–50, pp. 4 each*).—A series of leaflets, each one dealing with the range and occurrence, climate, associated species, habit, soil and moisture, tolerance, growth and longevity, reproduction, and management of one of the following species of trees in the order corresponding to the leaflet numbers above: Limber pine (*Pinus flexilis*), piñon pine (*P. edulis*), pignut hickory (*Hicoria glabra*), shagbark hickory (*H. ovata*), and big shellbark, king-nut hickory (*H. laciniosa*).

Trees every child should know, Julia E. Rogers (*New York, 1909, pp. 263, pls. 47*).—This popular work contains tree studies for autumn, winter, spring, and summer, consideration being given to the more common American trees and shrubs. Identification keys to tree groups and families are also given.

Illustrations of conifers, H. Clinton-Baker (*Hertford, 1909, vol. 1, pp. 75, pls. 68*).—This work consists of a series of life-size illustrations of the cones and foliage of conifers growing in the British Isles, supplemented by analytical keys of the species and by short and concise descriptions of each tree represented.

Bamboo in the Dutch Indies, J. A. Loebèr, Jr. (*Bul. Kolon. Mus. Haarlem, 1909, No. 43, pp. 90, pls. 26, figs. 4*).—This bulletin describes the various uses for which the bamboo may be employed, as for building purposes, furniture, supporting columns, musical instruments, ornamental work, etc.

The collection of statistical data relating to the principal Indian species, A. M. F. Caccia (*[Indian Forest Dept.] Pamphlet 8, Working-plan Ser. 2, pp. II+II+77*).—A series of experiments, with the rules and forms governing them, have been drawn up and are here presented, with the hope that after their details have been discussed by the various forest conservators in India they will be recognized as the standard rules for collecting statistical data regarding the development of the principal timber trees in India.

A method of studying growth and yield of longleaf pine applied in Tyler County, Texas, H. H. Chapman (*Proc. Soc. Amer. Foresters, 4 (1909), No. 2, pp. 207–220*).—This method is described and discussed.

The failure of silver fir regeneration in the central Murg Valley, H. Stoll (*Das Versagen der Weisstannenverjüngung im mittleren Murgtale. Diss. Tech. Hochschule Karlsruhe, 1909, pp. 64, figs. 6*).—The author presents evidence to show that the common failure of silver firs to reproduce in the region studied, as well as in similar regions of the Black Forest, is brought about by the

unfavorable soil conditions. The factors which create unfavorable conditions for reproduction are then examined and the results obtained in his investigations are reviewed. The failure of the firs to reproduce appears to be brought about by the souring and packing of the germinating bed. These conditions are to a great extent due to lack of humus in the soils, such soils being usually too cold and droughty for satisfactory germination purposes.

Fertilizer experiments with forest trees, KUHNERT (*Deut. Landw. Presse, 36 (1909), No. 82, pp. 878, 879, figs. 4*).—The results are given of commercial fertilizer experiments conducted in several forests in Schleswig-Holstein. The work included both deciduous and coniferous trees, and the results as a whole show the superiority of a complete fertilizer over the use of individual elements.

In one experiment with oak trees, started in 1903, the trees on the complete fertilizer plat were at the end of 5 years double the size of the trees on the plats receiving only partial fertilizer.

On the thinning of thick beech regenerations and beech seedings, D. TIEMANN (*Allg. Forst. u. Jagd Ztg., 85 (1909), pp. 368–374*).—Suggestions are given relative to methods of carrying on experimental thinnings in young beech stands.

Cooperative experiments in forest planting, F. J. PHILLIPS (*Nebraska Sta. Circ. 1, pp. 4*).—In this circular the author discusses the present attitude toward forestry in Nebraska, points out the need of experimental work and cooperation, and explains the nature of cooperative experiments which the station proposes to take up with interested farmers.

Our national parks, J. MUIR (*Boston and New York, 1909, rev. and enl. ed., pp. 382, pls. 31, map 1*).—The present edition of this work has been revised and enlarged to include more recently established national parks and forest reservations. The successive chapters discuss wild parks and forest reservations of the West, the Yellowstone National Park, the Yosemite National Park and its forests, wild gardens, animals, birds, fountains and streams, the Sequoia and General Grant National Parks, and the American forests. The appendix contains information relative to the location, area, and control of national parks and monuments.

Forest reservation in Burma in the interests of an endangered water supply, A. RODGER (*[Indian Forest Dept.] Pamphlet 6, Sylvicult. Ser. 2, pp. 24, pls. 3, map 1*).—A progress report of forest reservation work under way in the Natmauk township of the Magwe district, Burma. The report includes a general description of the tract, specific descriptions of the forests, and details of the work for 1907–8. An appendix contains a list of species found in the township.

The selection system in Indian forests as exemplified in working-plans based on this system, with a short description of some continental methods, A. M. F. CACCIA (*Indian Forest Rec., 1 (1909), No. 4, pp. 309–417*).—The purpose of this monograph is to present in concise form the different methods which have sprung up in the various provinces of India, to contrast these methods, and to indicate the advisability of adopting a standard system for the calculation of the possibility by the number of trees and by the volumetric methods, respectively.

Commercial aspects of the forests of the Dominican Republic, K. W. WOODWARD (*Bul. Internat. Bur. Amer. Repub. [English Sect.], 29 (1909), No. 5, pp. 914–924, figs. 6*).—In addition to export statistics of various timbers for 1907–8, an account is given of the timbered areas in Dominica, together with lists of trees growing in the different areas.

The estimation of forest revenue, A. ARNOULD (*Rev. Eaux et Forêts, 48 (1909), No. 21, pp. 641–649*).—A discussion of methods of estimating forest revenue for the purpose of taxation.

Forest mapping and timber estimating as developed in Maryland, F. W. BESLEY (*Proc. Soc. Amer. Foresters, 4 (1909), No. 2, pp. 196–206*).—A detailed account of work accomplished along this line in Maryland is given as having suggestive value at least for similar work in other States.

The standardizing of log measures, E. A. ZIEGLER (*Proc. Soc. Amer. Foresters, 4 (1909), No. 2, pp. 172–184*).—The author discusses the results secured by using several of the various log rules employed in this country, and comes to the conclusion that these measurements could be best standardized by measuring logs by the middle diameter and selling them by the cubic foot or hundred cubic feet, each producer in the various wood-using industries to determine his own factor for converting raw material into quantities of finished products.

Wood preservation—a determining factor in forest management, H. F. WEISS (*Proc. Soc. Amer. Foresters, 4 (1909), No. 2, pp. 185–195*).—The author states that the preservative treatment of timber may be considered a specialized branch of forestry, and aims in this paper to show the relation of this specialization to forestry and how one is an integral part of the other.

Shakes and shake-making in a California forest, C. H. SHINN (*Proc. Soc. Amer. Foresters, 4 (1909), No. 2, pp. 151–171*).—This is a brief presentation of the claims and limitations of this minor forest industry relative to its position in modern forest management.

DISEASES OF PLANTS.

The control of malnutrition diseases of truck crops, L. L. HARTER (*Virginia Truck Sta. Bul. 1, pp. 4–16, figs. 4*).—The practical conclusions derived from experiments made in cooperation with the Bureau of Plant Industry of this Department on the control of diseases of truck crops due to faulty nutrition are given. The technical results of the investigation are to be the subject for another publication.

In the region covered by this investigation commercial fertilizers are used to a great extent in connection with the production of trucking crops, and in some cases diseases have appeared that partially or wholly destroyed the crops. The diseased condition can be recognized by the retardation of growth, changes in color, root injury, etc. The most prominent conditions discovered in the lands subject to this trouble were their acidity, deficiency in humus, and absence of nitrifying bacteria.

One of the most important factors contributing to malnutrition was found to be the exhaustion of the organic material in the soil, and various methods were investigated to remedy or prevent the prevailing conditions. The means attempted were the limitation of the amount of fertilizer used, the adjustment of the composition of the fertilizer to the crop requirements, and the maintenance of organic matter in the soil. It was found that for many crops the amount of commercial fertilizer could be profitably reduced to a considerable extent, and the addition of lime was also of direct benefit with most crops. Stable manure applied at the rate of 10 to 20 tons per acre gave large increases in yield of cabbage and spinach, and experiments with cowpeas showed that good results could be obtained by the cultivation and plowing under of the crop. This, together with a proper rotation, it is thought will correct the troubles complained of.

The effects of conditions of growth upon susceptibility to fungus diseases, B. M. DUGGAR (*Trans. Mass. Hort. Soc., 1909, pt. 1, pp. 51–66*).—In this lecture before the Massachusetts Horticultural Society the author discussed the water relation, rôle of light, acidity and alkalinity of soil, nutrition, and temperature as factors of environment that contribute to predisposition to disease on the part of plants.

A contribution to the cytology of Synchytrium, S. KUSANO (*Bul. Col. Agr. Tokyo Imp. Univ., 8 (1909), No. 2, pp. 79–147, pls. 4*).—A study has been made of *S. puerariæ* and *S. decipiens*, in which it was found that the fungus always infects the host by responding to the chemical stimulus exerted by subepidermal cells which contain little or no chlorophyll. The swarm spores develop in these cells, at first in a single cell, but subsequently causing considerable enlargement by dissolving the walls of the surrounding cells and producing wide intercellular chambers.

The principal portion of the paper is taken up with a discussion of the cytology of the species.

Some differential characters of the vegetative state of Merulius lacrymans, J. BEAUVERIE (*Compt. Rend. Soc. Biol. [Paris], 66 (1909), No. 18, pp. 840–842*).—On account of the difficulty of recognizing the dry-rot fungus in its vegetative stage, the author has made a study of it in order to ascertain whether its presence could not be diagnosed without the fruiting bodies. He has found that the nuclei of the mycelium offer an excellent means for its determination.

Recent studies on the specialization of grass rusts, J. ERIKSSON (*Ark. Bot., 8 (1909), No. 1–3, Art. 3, pp. 26, pl. 1*).—A study has been made of the specialization of the crown rusts (*Puccinia coronifera* and *P. coronata*) occurring on various grasses. Inoculation experiments show that there are specialized forms of each species that readily infect certain grasses and not others. Eight form species of *P. coronifera* and 3 of *P. coronata* are recognized and their morphological and biological characters are described.

Studies on stem rot of cereals, F. KRÜGER (*Arb. K. Biol. Anst. Land u. Forstw., 6 (1908), No. 3, pp. 321–351, pl. 1*).—A series of experiments has been conducted to determine the cause of a stem rot of cereals which attacks the plants near their bases. A number of fungi have been associated with this disease, and the author conducted inoculation experiments with species of Leptosphæria, Dictyosporium, Ophiobolus, Hendersonia, Coniosporium, Fusarium, etc., in order to find out whether they are the immediate cause of the disease, as has been claimed, and also to establish if possible a relationship between some of the forms.

It was found that *Leptosphæria herpotrichoides* occurred not only on rye but occasionally also on wheat and that *Ophiobolus herpotrichus* attacked wheat and barley and also occurred on rye. No connection could be established between these fungi nor with *Hendersonia herpotricha.* It is claimed that while Leptosphæria and Ophiobolus do cause a disease of cereals, they are not the immediate cause of the trouble. Anything that weakens the plants, such as too much rain, frost injury, etc., makes them especially subject to attacks of these fungi, which are believed to be true parasites.

The proper reference of the smut of Bromus secalinus, P. MAGNUS (*Hedwigia, 49 (1909), No. 2–3, p. 100*).—The author calls attention to the fact that the Tilletia described as *T. belgradensis* (E. S. R., 20, p. 846) and also as *T. velenovskyi* had been previously described by Hariot as *T. guyotiana* occurring on *B. erectus.* This fungus is said to be rather commonly distributed throughout France, Servia, Bulgaria, and probably other parts of Europe and Asia.

Concerning the reputed relation of Myxomonas to root diseases of beets, F. C. VON FABER (*Arb. K. Biol. Anst. Land u. Forstw., 6 (1908), No. 3, pp. 352–*

362).—As a result of extended investigations the author is led to believe that Brzezinski is mistaken in considering *Myxomonas betæ* a cause of the heart and dry rots of beets. In his investigation the author was unable to find this organism in any cases of beet diseases studied. A preliminary account of his conclusions has been previously given (E. S. R., 20, p. 247).

The distribution of the cause of root disease through beet seed, W. BUSSE and P. ULRICH (*Arb. K. Biol. Anst. Land u. Forstw., 6* (*1908*), *No. 3, pp. 373–384*).—In investigating beet seed as a means of the distribution of the spores of beet diseases, the authors found that practically every lot of seed examined, no matter from what source obtained, contained infected material capable of causing diseased plants. Of the fungi observed on beet seeds *Phoma betæ* was by far the most common.

Chrysophlyctis endobiotica and other Chytridiaceæ, T. JOHNSON (*Sci. Proc. Roy. Dublin Soc., n. ser., 12* (*1909*), *No. 14, pp. 131–144, pls. 3*).—The author reports having found in Ireland in October, 1908, specimens of warty potatoes affected by *C. endobiotica*. An examination of the diseased material showed that the trouble was not confined to the tubers, but also affected all parts of the underground stem.

Notes are given on the life history of this fungus and its relationship to other members of the group, together with a brief account of methods for the prevention of the disease. On account of the peculiarities of the family of fungi as a group, it is believed that wet, undrained potato fields favor the spread of this disease. Experiments are being conducted in treating the warty tubers with fungicides to determine the possibility of destroying the fungi, but for the present the author thinks it desirable to destroy all tubers where the fungus is obviously present.

The fungi causing beet tumor (*Urophlyctis leproides*) and flax yellowing (*Asterocystis radicis*) are said to belong to the same group as that causing the warty disease of potatoes.

The dry rot of potatoes, SIBYL LONGMAN (*Jour. Linn. Soc.* [*London*], *Bot., 39* (*1909*), *No. 270, pp. 120–129, pl. 1*).—Investigations have been carried on to determine whether the fungus of dry rot of potatoes (*Fusarium solani*) is capable of inducing disease in the growing potato plant, and whether the dry rot can be induced in potato tubers directly by inoculation with spores, as it is commonly supposed dry rot usually follows wet rot.

As a result of the study, the author has reached the conclusion that *F. solani* is not only a true parasite of the resting tuber but also is capable of attacking the growing potato plant. In regard to the second question, there appears to be no time relation between an outbreak of dry rot and one of wet rot, and it is shown that dry rot may be induced by inoculating healthy potato tubers with cultures of the dry-rot fungus.

Experiments were made to determine the possibility of disinfecting the potato tubers by heating, but it was found that this was impracticable, as the death temperature of the fungus is higher than that of the potato.

Notes on a scab fungus of potatoes, A. EICHINGER (*Ann. Mycol., 7* (*1909*), *No. 4, pp. 356–364, figs. 3*).—Investigations are reported on the life history of *Spondylocladium atrovirens*, a fungus that causes a kind of scab of potatoes. Particular attention is given to the germination of the spores and to the development of the mycelium.

Observations on powdery potato scab (Spongospora subterranea), T. JOHNSON (*Sci. Proc. Roy. Dublin Soc., n. ser., 12* (*1909*), *No. 16, pp. 165–174, pls. 3*).—Notes are given on the fungus causing a form of potato scab which the author calls "powdery" scab. He quotes the opinions of different investi-

gators as to the cause of this disease and the identity of the fungus, and decides that from the evidence at hand it should be called *S. subterranea.*

Experiments have been carried on in pot cultures to test the possibility of preventing this disease. Treating scabby tubers with a 2 per cent solution of Bordeaux mixture gave a crop free from scab, but the use of sulphur was without any benefit. Covering uncut tubers with spores of the fungus did not affect the resulting crop. As a result of his experiments, the author recommends the planting of whole tubers previously treated with fungicides.

Leaf curl or bacterial ring disease of potatoes, J. BRANDL (*Wiener Landw. Ztg., 59 (1909), Nos. 70, pp. 691–693, figs. 4; 71, pp. 701, 702, figs. 5*).—A popular description is given of the leaf curl or bacterial ring disease of potatoes, which it is said has become widely distributed throughout Germany, Denmark, Holland, and Switzerland, and lately has become quite troublesome in a number of portions of Austria and Hungary.

The ring disease of potatoes, L. C. COLEMAN (*Dept. Agr. Mysore, Mycol. Ser. Bul. 1, pp. 15, pls. 14*).—This is a preliminary popular report on the bacterial disease of potatoes known as the ring disease, and is to be followed by a more technical paper giving the results of the author's investigations.

A new rust of orchids in greenhouses, E. GRIFFON and A. MAUBLANC (*Bul. Trimest. Soc. Mycol. France, 25 (1909), No. 3, pp. 135–139, pl. 1*).—A description is given of *Hemileia oncidii* n. sp., a fungus causing considerable injury to species of Oncidium growing in greenhouses.

Orchard fungus diseases, F. M. ROLFS (*Ann. Rpt. Mo. Bd. Hort., 2 (1908), pp. 63–70*).—Descriptions are given of a number of the more common fungus diseases of peach trees, with suggestions for their control. For most of the diseases the author has found self-boiled lime-sulphur mixture, if properly prepared and applied, to be very satisfactory.

A disease of neglected peach trees, F. M. ROLFS (*Ann. Rpt. Mo. Bd. Hort., 2 (1908), pp. 278–283*).—Attention is called to a disease of peach trees due to the fungus Cytospora, which has previously been described as occurring in New York (E. S. R., 13, p. 148).

Experiments conducted at the Missouri Fruit Station showed that the Cytospora is the imperfect form of *Valsa leucostoma*, and that the organism is capable of attacking the limbs, twigs, and trunks of peach, plum, apricot, and cultivated and wild cherry trees. It has also been observed on apple and pear trees and rose and raspberry canes. On the peach tree infections are said to take place invariably at the buds. If the weather conditions are favorable for its growth, the fungus becomes active during the late winter and early spring months, and periods of warm weather followed by late frost appear to render the tissues extremely favorable to its development.

During 1907 observations were made on the rate of advancement of the fungus, and the advancement on the twigs was found to average about 8 in. between February and October. Inoculations on healthy twigs of pure cultures of the fungus produced the characteristic winterkilled appearance. The fungus seems to start the wounds and plays a prominent part in extending the injury, but after it once gets established other organisms materially aid in destroying the trees.

Applications of Bordeaux mixture and lime-sulphur wash materially reduced the twig infections but did not check the enlargement of the cankers or sunscald areas produced by the fungus, and consequently these fungicides can not be relied upon as means of controlling the disease after the organism has once become established.

[Some peach diseases], M. A. BLAKE and A. J. FARLEY (*New Jersey Stas. Rpt. 1908, pp. 53–56, pls. 3*).—Descriptions are given of peach leaf curl and peach

yellows. Spraying with Bordeaux mixture or with lime-sulphur compound is recommended for peach curl, and the removal and destruction of the trees is suggested where yellows has become established.

A coffee disease in Guatemala, F. H. d'Herelle (*Bul. Trimest. Soc. Mycol. France, 25 (1909), No. 3, pp. 171–185, pls. 1*).—The author describes *Phthora vastatrix* n. sp., a fungus which is said to cause a serious disease in Guatemala, being particularly destructive in the plantations on the Pacific coast of that country.

The fungus causes the death of the trees by the hyphæ penetrating and clogging up the sieve tubes and by the destruction of the cambium. It seems to infect the trees beginning with the roots and spreading from them to the trunks.

Some diseases of cacao, F. C. von Faber (*Arb. K. Biol. Anst. Land u. Forstw., 6 (1908), No. 3, pp. 385–406, pl. 1, fig. 1*).—Descriptions are given of the witches' broom disease of cacao, due to *Taphrina bussei* n. sp., which attacks the young shoots, leaves, etc., and of a stem canker caused by a species of Nectria. Both diseases are said to be quite troublesome in Kamerun.

Diseases of cacao, J. H. Hart (*West India Com. Circ., 24 (1909), Nos. 289, pp. 509–513, figs. 4; 290, pp. 533–537, figs. 6*).—A summary is given of the diseases to which cacao is subject in the West Indies, with suggestions for their control. In all the author describes about 20 fungus diseases.

Some Botrytis diseases of Ribes, T. Wulff (*Ark. Bot., 8 (1909), No. 1–3, Art. 2, pp. 18, pls. 2, figs. 4*).—Descriptions are given of diseases of *Ribes aureum*, *R. rubrum*, and *R. grossularia* due to *Botrytis* sp., and the relation of the fungus to *Sclerotinia libertiana* is discussed.

The young shoots appear to be the portions most affected and on them the sclerotia are largely formed. Cutting out the shoots to admit air and light is recommended. Nitrogenous manures should be used sparingly about the bushes, as they seem to have an unfavorable effect.

Notes on some diseases of grapes and on rust diseases of plants, E. Griffon and A. Maublanc (*Bul. Trimest. Soc. Mycol. France, 25 (1909), No. 3, pp. 140–146*).—Brief notes are given on the downy mildew attacking the flowers of the grape and on black rot. The rusts described are *Puccinia graminis*, white pine rust (*Peridermium strobi*), and a rust of willows due to a species of Melampsora.

A species of Discosia on living bull pine seedlings, F. D. Heald (*Mycologia, 1 (1909), No. 5, pp. 215–217, pl. 1*).—A technical description is given of *D. pini* n. sp., which was found during an examination of the National Forest at Halsey, Nebr., in 1907, while an effort was being made to determine the cause of a blight of young pine seedlings. A number of species of this genus are recorded, but all seem to be saprophytic. This species, which is apparently new, was found growing on living seedlings of *Pinus ponderosa*. It has not yet been determined whether this fungus was connected in any way with the blight that was then prevalent.

Abnormalities in Hevea brasiliensis, T. Petch (*Circs. and Agr. Jour. Roy. Bot. Gard. Ceylon, 4 (1909), Nos. 17, pp. 147–154, pls. 2; 18, pp. 155–164, pls. 2*).—Attention is called to some frequent abnormalities in seedlings of *H. brasiliensis* and also in the trunks of the trees. The principal abnormality of the seedlings consist of peculiar twistings of the different parts of the plant following germination, while in the trunks the author describes certain burs and nodules that occur in the bark or immediately beneath it which seem to be associated in some way with the pricking instruments used in tapping this tree.

Investigations on the immunity and susceptibility to disease of woody plants, E. MÜNCH (*Naturw. Ztschr. Forst u. Landw.*, 7 (1909), Nos. 1, pp. 54–75, fig. 1; 2, pp. 87–114, figs. 4; 3, pp. 129–160).—Studies have been made of the effect of moisture, air, and other factors in wood on the development of fungi. Inoculation experiments were made with the spores of various fungi and the growth determined.

In experiments with blue rot of timber (*Ceratostomella cœrulea*) the sapwood of pine was found to be immune to the fungus attack when the volume of air in the timber was about 15 per cent of the volume of the fresh wood. This was obtained when the normal winter water content was increased about 12 per cent. A water content of 17 per cent and a volume of air equaling 42 per cent was found the optimum for the development of the fungus. Free water was not necessary for the development of the mycelium, but if the water of imbibition was reduced considerably the growth of the fungus was impossible.

Similar experiments were carried on with various species of Agaricus, Polyporus, Stereum, etc., on horse chestnut, poplars, and other species, with Nectria on elm and beech, etc., and the volume of air in proportion to the moisture content was found to be an important factor in fungus development. Different species of fungi were found to differ very materially in their requirements in this respect.

Instructions for spraying, W. H. CHANDLER (*Ann. Rpt. Mo. Bd. Hort.*, 2 (1908), pp. 314–324, pls. 5).—Directions are given for the preparation and application of some of the more common fungicides and insecticides, and the author indicates the times of application and the best form of solutions to use for different diseases. In this connection attention is called to the results that have been obtained with dust sprays. It is stated that dust sprays are so much less efficient in controlling insects and fungus diseases of orchards that they are seldom if ever to be recommended.

Copper in vineyard soils (*Rev. Sci.* [*Paris*], 47 (1909), II, No. 4, pp. 114, 115).—An account is given of investigations conducted from 1886 to 1906 by E. Chuard, of Lausanne, in which he sought to determine the amount of copper deposited in soils by spraying. During this time he estimates that there was about 26 gm. of copper deposited in each square meter of the soil, and an attempt was made to determine whether this remained in the superficial portions of the soil or was carried below and out of reach of the roots. Analyses showed that the quantity of copper found in the surface was small, the greater portion of it having been washed into the soil by infiltration.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

Game laws for 1909, T. S. PALMER, H. OLDYS, and C. E. BREWSTER (*U. S. Dept. Agr., Farmers' Bul. 376, pp. 56, figs. 2*).—This summary, similar in scope to those issued annually since 1902, includes changes in the laws made during the present year. The information given has been revised and the section relating to seasons entirely rewritten to show the open instead of the closed seasons. In the section relating to the legislation of the year a review is given of the new laws and the more important bills which failed to pass.

Report on the use of virus for extermination of rats, J. M. YOUNG (*Aberdeen and No. of Scot. Col. Agr. Bul. 12, pp. 10*).—Tests were made of 3 commercial products claimed to be pathogenic in rats, namely, Danysz bacillus, Liverpool virus bacillus, and the bacillus of ratin (Nos. 1 and 2), the 3 preparations being used in localities at considerable distances from each other.

From the reports received the following conclusions have been drawn: Each product was successful in killing rats. There was no suggestion of any being

harmful to other animals, except in one instance, where one product was thought to be fatal to hens, but of this direct proof was lacking. The comparative cost for the extended areas used in this test was, per 100 acres, for the Liverpool virus £1, for the ratin virus £2 5s., and for the Danysz virus £1 10s.

Plague among ground squirrels in Contra Costa County, California, W. C. RUCKER (*Pub. Health and Mar. Hosp. Serv. U. S., Pub. Health Rpts., 24 (1909), No. 35, pp. 1225–1235*).—The author states that there is reason to believe that the booby owl, which is a constant companion of the ground squirrel, occupying the same burrows with it, may play an important rôle in the dissemination of the epizootic. It is thought that this bird, flying from burrow to burrow, may carry infected fleas for long distances. Squirrel eradicative agents and the campaign against the ground squirrel are considered at some length.

The birds of Ontario in relation to agriculture, C. W. NASH (*Ontario Dept. Agr. Bul. 173, pp. 95, pls. 48*).—This is the fourth edition of a work previously noted (E. S. R., 13, p. 1023).

Some indigenous insectivorous birds, S. H. CURNOW (*Jour. Dept. Agr. So. Aust., 13 (1909), No. 1, pp. 17–20*).—A brief account of some of the more useful birds occurring in South Australia.

Crustacea and Arachnids, edited by S. F. HARMER and A. E. SHIPLEY (*New York and London, 1909, vol. 4, pp. XVIII+566, figs. 287*).—This volume, which completes the series entitled Cambridge Natural History, contains an account of the Crustacea by G. Smith and W. F. R. Weldon, of the Trilobites, by H. Woods, of the Arachnida, by A. E. Shipley, H. Woods, and C. Warburton, and of the Pycnogonida, by D. W. Thompson.

Classification of the Strongylidæ, A. RAILLIET and A. HENRY (*Compt. Rend. Soc. Biol. [Paris], 66 (1909), Nos. 2, pp. 85–88; 4, pp. 168–171*).—Part 1 of this account is devoted to the Metastrongylinæ and part 2 to the Ankylostominæ, this term being applied to those Strongylidæ that have a buccal capsule. Six genera and several species are described as new.

Bibliography of Canadian zoology for 1907, L. M. LAMBE (*Proc. and Trans. Roy. Soc. Canada, 3. ser., 2 (1908), Sect. IV, pp. 77–87*).—This lists 113 titles ascribed to 85 authors.

Bibliography of Canadian entomology for the year 1907, C. J. S. BETHUNE (*Proc. and Trans. Roy. Soc. Canada, 3. ser., 2 (1908), Sect. IV, pp. 89–103*).—This lists 127 titles by 124 authors.

A survey of the status of economic entomology in the United States, F. SILVESTRI, trans. by J. ROSENSTEIN (*Bol. Quind. Soc. Agr. Ital., 14 (1909), No. 8, pp. 305–368; Hawaii. Forester and Agr., 6 (1909), No. 8, pp. 287–336*).—This is a report on the present status of economic entomology, following a visit to the United States including the Hawaiian Islands. Artificial methods of insect control are considered but more particular attention is given to natural control.

A light-weight, portable outfit for the study and transportation of ants, EDITH N. BUCKINGHAM (*Amer. Nat., 43 (1909), No. 514, pp. 611–614, figs. 2*).—A brief description is given of the apparatus used by the author in biological studies of ants.

The relation of lepidoptera and other insects to the fertilization of the Asclepiadaceæ, particularly Araujia sericofera, J. K. D'HERCULAIS (*Compt. Rend. Acad. Sci. [Paris], 148 (1909), No. 18, pp. 1208–1210*).—The author concludes that the rôle of insects in the fertilization of the milkweeds is much less important than that attributed to them by most naturalists.

Revision of the Attidæ of North America, G. W. and ELIZABETH G. PECKHAM (*Trans. Wis. Acad. Sci., Arts and Letters, 16 (1909), pt. 1, No. 5, pp. 355–646, pls. 23*).—A genus and many species are described as new to science.

Observations on two species of Hyalopterus, P. HAYHURST (*Jour. N. Y. Ent. Soc., 17 (1909), No. 3, pp. 107–115, pl. 1*).—*Hyalopterus aquilegiæ-flavus* which infests the columbine and rose in Europe has been found on these plants at Forest Hills, Mass. *H. dactylidis*, taken from the orchard grass in the District of Columbia and at Forest Hills, is described as new. *Lysiphlebus cerasaphis* and *Ephedrus* sp. were bred at Forest Hills from this new species.

Some new and little known Coccidæ, T. D. A. COCKRELL and W. W. ROBBINS (*Jour. N. Y. Ent. Soc., 17 (1909), No. 3, pp. 104–107, figs. 3*).—*Aspidiotus arctostaphyli* from leaves of *Arctostaphylos viscida* taken at Red Bluff, Cal., and *Chionaspis sassceri* from the orange at Fallbrook, Cal., are described as new to science.

Contribution to a study of the Coccidæ of West Africa, P. MARCHAL (*Mem. Soc. Zool. France, 22 (1909), No. 1–2, pp. 165–182, pls. 2, figs. 8*).—Eleven species of scale insects are here considered.

Scale insects from West Africa, P. MARCHAL (*Compt. Rend. Soc. Biol. [Paris], 66 (1909), No. 13, pp. 586–588*).—The genus Houardia and 2 species from Senegal are described as new.

The parasitic fungi of scale insects in the West Indies (*Agr. News [Barbados], 8 (1909), No. 193, p. 229*).—There are said to be 4 species of fungi parasitic on scale insects at present known in the West Indies. These are the red-headed fungus (*Sphærostilbe coccophila*), the white-headed fungus (*Ophionectria coccicola*), the black fungus (*Myriangium duriæi*), and the shield-scale fungus.

The apple sucker and its treatment, F. V. THEOBALD (*Irish Gard., 4 (1909), No. 37, pp. 33–35, figs. 8*).—An account of the biology of *Psylla mali* and the methods of combating it.

The genus Chermes in its relation to forestry, R. S. MACDOUGALL (*Jour. Bd. Agr. [London], 16 (1909), No. 6, pp. 441–453, pls. 2, fig. 1, dgms. 3*).—A brief account of the species of Chermes occurring in Great Britain.

Studies on the Trichoptera of Wisconsin, C. T. VORHIES (*Trans. Wis. Acad. Sci., Arts and Letters, 16 (1909), pt. 1, No. 6, pp. 647–738, pls. 10*).—Studies of the life history and habits of caddice flies, with technical descriptions of the stages. A complete bibliography of the American species is appended.

Fourth annual report of the superintendent for suppressing the gipsy and brown-tail moths, L. H. WORTHLEY (*Ann. Rpt. Supt. Suppressing Gipsy and Brown-tail Moths [Mass.], 4 (1908), pp. 75, pls. 12*).—During 1908 the fight against the gipsy and brown-tail moths was carried on along practically the same lines as in the 3 preceding years (E. S. R., 22, p. 55). The climatic conditions were favorable to the caterpillars but decidedly adverse to the increase of certain fungus and bacterial diseases which have in recent years been of great assistance as checks, so that the pests developed very rapidly. The principal devastation was confined to woodlands of low valuation.

The experience of the year showed the importance of equipping each city and town with adequate spraying outfits. Scouting during the early part of the year by about 100 trained men resulted in the discovery of a number of small colonies of the gipsy moth in several towns along the border of the district previously known to be infested.

The brown-tail moth was found to extend over an area comprising more than 5,000 square miles. A list of 192 towns known to be infested by the gipsy moth, and maps showing the area infested by the 2 pests on January 1, 1909, are given.

Experiments conducted have shown that young gipsy moth caterpillars can not live on white pine foliage in their early stages, and seem to give final and conclusive proof that where the hardwood growth is thoroughly destroyed in

a pine forest, there need be no fear from damage by the gipsy moth caterpillars, provided the trees are properly protected from invasion from without by the use of sticky bands. This discovery is considered to be of great practical importance as it will permit of the general planting and cultivation of white pine without fear of damage from the moths.

During the year experts were employed to investigate the wilt disease of the gipsy moth, which is probably bacterial, but no definite conclusions were arrived at.

An investigation during the summer by G. P. Clinton of the fungus disease of the brown-tail moth, due to *Entomophthora aulicæ*, led him to express the opinion that the outlook for a practical application of this disease by means of the distribution of infected material is unfavorable. At the same time, as the unusual dryness of the season afforded the most unfavorable conditions possible, it is considered that a continuation of the investigation is necessary, particularly since in 1907 considerable success was met with in the dissemination of the disease.

A report by F. Silvestri, of the Royal School of Agriculture, Portici, Italy, following an investigation of the work of suppression, is presented in which the author recommends a continuation of the work along the same lines, particular emphasis being placed upon the work with parasites.

The report of L. O. Howard, under whose direction the work with parasites is being carried on, is appended to the general report. "There have been imported, in all, 23 species of hymenopterous parasites, of which 16 are European, 6 are from Japan, and 1 at least is common to both regions. Eleven of these have been reared from the gipsy moth, 6 from the brown-tail moth, and 6 from both insects. A number of species of secondary parasites have been reared and have been killed. Of dipterous parasites, at least 29 distinct species have been imported, of which nearly all are parasitic upon both gipsy and brown-tail moths. Of Coleoptera, 5 species have been imported, all of which will feed upon both gipsy moth and brown-tail moth. This makes a total of 57 beneficial species, enemies of gipsy moth or brown-tail moth, or both, that have been brought over in the course of this work."

The outlook is deemed more favorable than at any period during the progress of the work. While success seems an ultimate certainty, the time at which obvious results will be apparent is as yet uncertain.

The Hawaiian sugar cane bud moth (Ereunetis flavistriata), with an account of some allied species and natural enemies, O. H. SWEZEY (*Hawaiian Sugar Planters' Sta., Dir. Ent. Bul. 6, pp. 40, pls. 4*).—*E. flavistriata*, variously known as the bud moth, budworm, or sheath moth of sugar cane, is very abundant in all cane fields throughout the Hawaiian Islands. Its eating of the leaf sheaths and the leaves does no apparent injury to the cane as it is done on the dead or nearly dead leaves. The eating of the rind may be considered as injurious in the extent to which it may allow an entrance for fungus spores, etc. The eating of the eyes, however, is a very serious injury not merely from its producing a condition, or an opportunity for the admission of fungus spores, but chiefly by its rendering the cane valueless for seed.

The larvæ of this moth also feed on dead leaves of palms, bananas, pineapples, and Pandanus, and among the bananas on the bunch, eating dead tissues and sometimes the skin of the fruit. The eggs are laid singly or often a few near together on the inner surface of the leaf sheath, sometimes on the outer surface as well, deposited lengthwise in the slight longitudinal grooves of its surface. The larvæ become full-grown in 8 weeks from the time of hatching.

The pupa is formed within a cocoon made in the same location in which the larva fed. The moth emerges in 2 or 3 weeks.

Of 5 other species of Ereunetis which occur in Hawaii and here noted, 3 are described as new to science. Four species of Opogona are noted of which 2 are described as new. The so-called dancing moth, an undetermined species, is abundant in Oahu, its larvæ often being found in sugar cane associated with larvæ of the bud moth. The larvæ of *Autosticha pelodes* are sometimes associated with budworms in the cane, but probably do no injury. The larvæ of *Batrachedra rileyi* has been found feeding beneath leaf stalks of dead cane and also in bored cane stalks. *Cryptoblabes aliena*, which is described as new to science, appears to be a general feeder.

Three parasites, *Sierola molokaiensis*, *Melittobia hawaiiensis*, and *Microdus hawaiicola* have been bred from the budworm. The red ant (*Pheidole megacephala*) destroys more or less of the young budworms and of the other moths here considered. Several species of Odynerus have been observed in cane fields hunting for budworms and other tineid larvæ. It is said that the injury done by the eating out of the eyes of the cane is not sufficient to warrant any extensive operations against the budworm.

Observations on the habits and injury of the asparagus fly (Platyparea pœciloptera) in the vicinity of Paris, P. LESNE (*Compt. Rend. Acad. Sci. [Paris], 148 (1909), No. 3, pp. 197–199*).—This fly is said to be the source of injury in a large territory to the north of Paris, but does not seem to have made its appearance to the south. Emphasis is placed upon the importance of the destruction of all affected shoots as soon as they wither.

Biological investigations of the viviparity and larval life of Glossina palpalis, E. ROUBAUD (*Compt. Rend. Acad. Sci. [Paris], 148 (1909), No. 3, pp. 195–197*).—This is a brief report of biological investigations of the tsetse fly.

Distribution of certain species of biting flies in the Federated Malay States, H. C. PRATT (*Jour. Trop. Vet. Sci., 4 (1909), No. 3, pp. 390–394*).—This is a brief report on a large number of flies of the family Tabanidæ and of the genus Stomoxys, which were obtained in various parts of the Federated Malay States in connection with the work on surra.

Report on the mosquito work for 1908, J. B. SMITH (*New Jersey Stas. Rpt. 1908, pp. 381–428, pls. 2*).—The season of 1908 is said to have been an abnormal one in many respects and favorable to the development of mosquitoes of all kinds. In the expenditure of the appropriation of $20,000, an area of 6,669 acres was drained, 888,650 ft. of ditching being dug. From a study of mosquito eggs on salt marsh, it is concluded that an individual ovum may maintain its vitality for 2 or even 3 years. It was found that in the same woodland pool, 3 different species may appear in 3 successive years, each species by itself and without any admixture of the species that was in the same pool at the corresponding time in the previous year.

Due to the favorable season the house mosquito was so abundant in the larger cities that the benefits derived from the absence of the salt-marsh mosquito were not fully appreciated.

Notes made by J. T. Brakeley on *Culex perturbans* are presented. The first larvæ of this species were collected on March 7, at which time 6 well-grown individuals were washed out, having evidently been attached to the floating roots. It thus appears that they freeze and thaw out with the floating vegetation. It is concluded from the observations that the pupæ of this species never voluntarily come to the top in a state of nature, but that the adults emerge under water and pop up to the surface.

A paper by J. A. Grosbeck entitled The Mosquitoes of the Season, with notes on the eggs found in the salt-marsh work is appended to the report. *Culex dyari* was collected in the State for the first time.

Mosquitoes and malaria in Dehra Doon, India, F. W. THOMSON (*Jour. Roy. Army Med. Corps, 12 (1909), No. 5, pp. 502-508*).—A list of mosquitoes inhabiting Dehra Doon and the country in the immediate neighborhood is included in this account. The commonest species in the barracks were *Myzomyia rossii, M. culicifacies, Nyssorhynchus maculatus*, all the Stegomyiæ, and *Culex fatigans*.

Practical information on the scolytid beetles of North American forests. I, Bark beetles of the genus Dendroctonus, A. D. HOPKINS (*U. S. Dept. Agr., Bur. Ent. Bul. 83, pt. 1, pp. 169, pls. 2, figs. 102*).—This work deals with the more practical results of extensive investigations conducted between 1891 and 1908, and thereby supplements Technical Bulletin 17, pt. 1, previously noted (E. S. R., 21, p. 557). A detailed account is given of the distribution, seasonal history, habits, economic features, and methods of control, so far as known, of 23 species.

The investigations are said to have clearly shown that some of the species of this genus of beetles are the most destructive enemies of the coniferous forest trees of North America, and it is considered probable that if the timber destroyed by these insects in the United States in the past 50 years were living to-day the stumpage value would be more than $1,000,000,000. In regard to the possibilities of control the author reports that experiments and practical demonstrations make it clear that wherever private, state, or national forests are under organized management for fire protection and economic utilization, the control of these insects is often a less difficult and less expensive problem than that of controlling forest fires.

All of the species of Dendroctonus studied have demonstrated their ability to attack healthy trees and kill them whenever the individuals of a species occur in sufficient numbers to overcome the resistance of the tree. In combating these pests success depends largely on a knowledge of the proper time to begin and end certain timber-cutting or barking operations for the destruction of the broods of the beetles. The natural enemies are considered under the headings of insects, birds, diseases of the insects and diseases of the trees.

The western pine beetle (*Dendroctonus brevicornis*) attacks western yellow pine and sugar pine and is destructive to living timber in the mountains of California and northward and eastward to Washington and Montana. It is especially destructive to the western yellow pine in central Idaho and in the mountains of the higher valleys of eastern Washington, Oregon, and California. In localities where it is known the principal clumps of infested trees should be located from September to March, and the infested bark on the main trunk and larger branches removed and burned or the logs converted into lumber and the slabs burned, between October and June 1.

The southwestern pine beetle (*D. barberi*) attacks western yellow pine in southern Colorado and Utah, and in the mountains of Arizona, New Mexico, western Texas, and northern Mexico. The methods of control are similar to those of the western pine beetle. The roundheaded pine beetle (*D convexifrons*) attacks western yellow pine from southern Arizona to northern New Mexico and southern Colorado. As this species is usually associated with others its specific relation to the death of trees is doubtful. The southern pine beetle (*D. frontalis*) attacks all of the pines and spruces of southern Pennsylvania southward into Florida and westward into eastern Texas and Arkansas.

In order effectually to destroy the insect it is only necessary to remove the infested bark from the trunks and burn it.

The Arizona pine beetle (*D. arizonicus*) attacks western yellow pine in central Arizona. The smaller Mexican pine beetle (*D. mexicanus*) and the larger Mexican pine beetle (*D. parallelocollis*) attack pine trees in Mexico. The Colorado pine beetle (*D. approximatus*) attacks western yellow pine from central Colorado and Utah to southern Arizona and New Mexico. The mountain pine beetle (*D. monticolæ*) attacks silver or western white pine, western yellow pine, and lodgepole pine, in Montana, western Wyoming, Idaho, Oregon, and Washington, and also sugar pine, western yellow pine, and lodgepole pine in the mountains of Washington, Oregon, and California. The simple removal of the bark without burning is sufficient to kill the broods of this species. The infested trees should be located and marked in September and the infested bark removed from the main trunks during the period from October to July.

The Black Hills beetle (*D. ponderosæ*) attacks yellow pine, lodgepole pine, limber pine, Mexican white pine, white spruce, and Engelmann spruce from the Black Hills, South Dakota, to southern Arizona and westward into Utah, and is very destructive. The bark should be removed from the main trunk of the trees between October 1 and June 1. It appears to have been brought under complete control within the radius of some hundreds of square miles in the vicinity of Colorado Springs, Colo., through the felling and barking of trees within the period necessary to destroy the broods. At another locality in Colorado where more than 250,000 ft. of timber was infested it was brought under control through the cutting and barking of the timber or the destruction of the slabs by burning, as recommended.

The Jeffrey pine beetle (*D. jeffreyi*) attacks Jeffrey pine and yellow pine in the Yosemite National Park and San Bernardino County, California. The methods of control are the same as for the two preceding species. The eastern larch beetle (*D. simplex*) attacks eastern larch, from New Brunswick westward to northern Michigan, and probably to the western and northern limit of this tree, and south in the higher Alleghenies to northeastern West Virginia and western Maryland. The infested trees should either be barked, burned, or placed in water, and the stumps barked, during the period between September and the following May. Trap trees felled during May and June should serve to attract the beetles away from living trees and thus facilitate their destruction by removing the bark during the following fall and winter.

The Douglas fir beetle (*D. pseudotsugæ*) attacks Douglas fir, bigcone spruce, and western larch, wherever these trees grow from British Columbia southward into New Mexico, Arizona, and California. In order effectually to check its ravages at least 75 per cent of the trees affected should have the infested bark removed from the main trunks or the logs converted into lumber and the slabs burned during the period beginning with the first of November and ending the first of the following March. The eastern spruce beetle (*D. piceaperda*) attacks the red, black, and white spruce from New Brunswick, Canada, southward in the mountains of New York and Pennsylvania and westward to Michigan. The removal of the infested bark from the trunks of the trees without burning is all that is necessary to kill the immature stages of the insect at any time. If the work be done during the period beginning with the middle of October and ending with the middle of May, say at or below an elevation of about 1,800 ft. at latitude 45°, the parent adults and developed broods of adults, together with the immature broods, will be killed. It is stated that the injury to mature spruce in northwestern Maine appears to have been checked through the concentration of logging operations in infested sections, as recommended by the author.

The Engelmann spruce beetle (*D. engelmanni*) attacks the Engelmann spruce and probably other spruces from central Idaho southward to the mountains of southern New Mexico and the white spruce in the Black Hills of South Dakota. The methods of controlling this beetle are essentially the same as for the eastern spruce beetle. The Alaska spruce beetle (*D. borealis*) is but little known. The Sitka spruce beetle (*D. obesus*) attacks the Sitka spruce from Newport, Oreg., northward along the coast of Alaska, probably following the distribution of the tree in which it lives. The redwinged pine beetle (*D. rufipennis*) attacks felled white pine in northwestern Michigan. The lodgepole pine beetle (*D. murrayanæ*) attacks the lodgepole pine in southern Wyoming and occurs northward to Alberta, B. C.

The Allegheny spruce beetle (*D. punctatus*) has been collected in West Virginia on a red spruce tree felled the previous winter. But little is known of its habits. The European spruce beetle (*D. micans*) attacks spruce, pine, fir, and larch from central to northern Europe and in Denmark, Russia, and eastern Siberia. The black turpentine beetle (*D. terebrans*) attacks pine and spruce from Long Island, N. Y., southward to Florida and westward to Texas and West Virginia, but it is more common in the South Atlantic and Gulf States. Methods of control should be based on the prevention of the primary injury by preventing the undue multiplication of the beetle, or by furnishing a continuous supply of more attractive breeding places, as in the case of continued lumbering operations. The red turpentine beetle (*D. valens*) attacks pine and spruce in eastern United States and Canada, northward from the mountains of North Carolina, westward to the Pacific coast, and southward from British Columbia into Mexico. The methods of control for this species are much similar to those for the black turpentine beetle.

A bibliography of the economic literature is appended to the account.

New South American Hymenoptera, C. Schrottky (*An. Soc. Cient. Argentina, 67 (1909), No. 5, pp. 209–228*).—Of the numerous new species here described from Brazil, Uruguay, Paraguay, and Argentina, several from Paraguay represent the parasitic families.

Nutritive exchanges in the bees during the 4 seasons, Marie Parhon (*Ann. Sci. Nat. Zool., 9. ser., 9 (1909), No. 1, pp. 1–57, figs. 23; abs. in Naturw. Rundschau, 24 (1909), No. 35, pp. 443–445*).—A physiological study of the bees.

The Ichneumons of Great Britain, C. Morley (*Plymouth, 1907, vol. 2, pp. XVI+351, pl. 1, figs. 22; 1908, vol. 3, pp. XVI+328, pl. 1, figs. 14*).—A descriptive account of the families, genera, and species indigenous to the British Islands, together with notes as to the classification, localities, habitats, hosts, etc.

In the first volume, previously noted (E. S. R., 16, p. 279), the Ichneumoninæ are considered; in the second volume the Cryptinæ are taken up, 41 genera and 317 species being recorded, of which 2 genera and 7 species are new to science; and in the third volume the Pimplinæ are considered, 39 genera and 211 species being recorded, of which 1 genus and 8 species are new to science.

The oviposition of Aphelinus mytilaspidis, P. Marchal (*Compt. Rend. Acad. Sci. [Paris], 148 (1909), No. 18, pp. 1223–1225*).—A report of the author's observations on the oviposition of this parasite in *Aspidiotus ostreæformis*. It is considered probable that some of the scales are punctured simply for food.

Report of the entomologist, J. B. Smith (*New Jersey Stas. Rpt. 1908, pp. 305–378, pl. 1, figs. 8*).—During the year under report the elm-leaf beetle appeared in large numbers, resulting in the largest brood that the author has known. Attempts to establish the parasite *Tetrastichus xanthomelænæ*, imported from France as previously noted (E. S. R., 20, p. 957), apparently failed in New Jersey.

The white-marked tussock moth was unusually abundant on shade trees in cities and towns in the eastern part of the State. The wood leopard moth was less troublesome in the large cities than for several years previous. Parasites appear to have caused the almost complete elimination of the catalpa sphinx during 1908. The moths of the snow-white Eugonia appeared in great abundance in Hudson and Essex counties, this being its first appearance in numbers for several decades.

The black peach aphis was abnormally abundant on the roots of trees in the southern sections of the State. The fungus *Sphærostilbe coccophila* was found in September on *Aspidiotus forbesi*, infesting cherry trees. Other insects of the year briefly noted include the pear psylla, grape plum moths, rose chafer, strawberry leaf roller, strawberry weevil, cutworms, cabbage worms, tomato worms, corn worms, onion thrips, flea beetles, plant bugs, asparagus beetles, digger wasps (*Sphecius speciosus*), Chinese mantids, ants, Angoumois grain moth, and the mushroom sciara (*Sciara multiseta*).

Insects mentioned as affecting cranberries are cutworms, flea beetles, and grasshoppers. Notes are given on the life history and habits of the flea beetle (*Chætocnema confinis*), which was the source of injury to the sweet potato. The use of arsenate of lead or a delay in setting out is recommended. Three species of tortoise beetles or gold bugs were also found in more or less abundance on sweet potatoes.

From observations on root maggots, reported by E. L. Dickerson, it appears that the great majority, if not all of the cabbage root maggots, passed the winter in the pupal stage. *Phorbia ceparum*, *Euxesta notata*, and *Tritoxa flexa* were bred from infested onions. There was no evidence that the fertilizer containing carbolic acid had been of any benefit in checking the maggot, although it may prove that it does if applied at just the right time. Cooper's V_1 and V_2 fluids used liberally upon maggot-infested plants proved of little value. As a protection to the cauliflower and cabbage plants the tarred paper disks proved to be both practical and effective.

Under records of the experiment orchard it is stated that such scale-killing materials as were tried proved ineffective. Notes are also given on various insecticides, including arsenate of lead, miscible oils, aphine, picric acid, carbolic acid, carbolic acid emulsion, carbolic acid fertilizer, lime and carbolic acid, Bogart's sulphur compound, lime and sulphur, and Cooper's V_1 and V_2 tree sprays. The author considers that for use against plant lice in the garden and greenhouse, Aphine has not been excelled by anything known to him and thinks that in the field it will probably do as well should the price be sufficiently low.

Report of the government entomologist for the year 1907, C. P. Lounsbury (*Rpt. Govt. Ent.* [*Cape Good Hope*], *1907, pp. 45–57*).—In the inspection of imports apples from Tasmania, apple stocks from England, and roses from Holland were found infested by the oyster-shell scale and a quantity of gooseberry bushes from England by an undetermined Lecanium. Several small consignments of Madeira apples were refused admittance on account of fruit fly infestation.

Under the nurseries inspection and quarantine act, the red scale (*Chrysomphalus aurantii*), the circular purple scale (*C. aonidum*), the Ross black scale (*C. rossi*), the purple or mussel scale (*Lepidosaphes beckii*), the Glover or long scale (*L. gloverii*), the white peach scale (*Aulacaspis pentagona*), and the woolly aphis were proclaimed pests within the meaning of the act. The red scale, white peach scale, and woolly aphis are said to be very common pests. The circular purple scale was found to be well established in 2 florist nurseries. The Ross scale, while common in the Transvaal, has not been found in the Cape

nurseries. The purple scale was found in 1 nursery and was exterminated, while the Glover scale was found near nurseries but not on any nursery stock.

Preliminary work in a study of the transmission of blue tongue or malarial catarrhal fever of sheep was begun. Attempts made to feed mosquitoes on affected sheep were not carried to a satisfactory termination through the great difficulty in getting mosquitoes to feed on the animals.

The work against locusts is considered at some length. As predicted in the previous report, the colonies suffered a greater infestation by the brown locust than has been experienced since 1893. The Plasmopara vine disease is briefly discussed. An apparently undescribed scale which is closely related to the San José scale was discovered to have become established at Bloemfontein. Three parasites were reared from codling moths collected in the Cape peninsula, 2 of which have been determined as *Pimpla heliophila* and *Hymenibosmina pomonellæ*. Attempts to introduce a parasite of the red scale from West Australia were unsuccessful. In experiments with the fruit fly (*Ceratitis capitata*) in which boxes were kept at temperatures of 38 to 40° F. for 21 days, all of 266 maggots were found to be dead when examined and 2 puparia discovered failed to develop. The Kafir corn aphis was a subject of special inquiry. The Erinose disease of the vine, caused by *Phytoptis vitis*, is said to have spread widely in western vineyards in late years.

Some insect pests of last season, F. THOMSEN (*Transvaal Agr. Jour., 7 (1909), No. 28, pp. 675–678, pls. 3, map 1*).—An account of the more important insects occurring in the Transvaal.

A study of three injurious insects (*Bul. Mens. Off. Renseig. Agr.* [*Paris*], *7 (1908), No. 12, pp. 1491–1513*).—This article forms the principal part of a report of work conducted in the Gironde in 1907 upon *Eudemis botrana*, *Phyllodecta vulgatissima*, and *Termes lucifugus*.

Some insects injurious to cabbage, cucumbers, and related crops, F. H. CHITTENDEN (*Virginia Truck Sta. Bul. 2, pp. 19–48, figs. 14*).—These studies were in cooperation with the Bureau of Entomology of this Department.

Aphids are said to have been the most important insect pests in tidewater Virginia during the past few years. During the spring of 1908, a serious outbreak of the cabbage aphis occurred, the loss amounting to from 65 to 80 per cent of the crop in infested fields. A braconid, *Lipolexis piceus*, was the most effective agent in the natural control of this pest.

In remedial experiments, conducted during the year and reported by C. H. Popenoe, it was found that atmospheric and other conditions being equal, and without high winds or ensuing rain, there is little difference in the effects of kerosene-soap emulsion, diluted with 15 parts of water, and whale-oil soap at the rate of 8 lbs. to 50 gal. of water. Experiments indicate that fumigation methods can scarcely be of value in the treatment of field cabbage for the cabbage aphis.

The spinach aphis (*Myzus persicæ*), was the source of very severe injury in the trucking region of Norfolk, Va., during the fall and early winter of 1907, affecting about 1,000 acres and causing loss estimated at $750,000. The seed-corn maggot (*Pegomya fusciceps*) was observed during April and May doing great damage to late-planted beans in the vicinity of Diamond Springs, Va. In certain areas, rows were entirely killed off, necessitating replanting. As many as 5 to 10 maggots were found in single seed beans, and in many cases in nearly every seed.

During 1908–9, the imported cabbage worm was present in all fields of cabbage and other cole crops doing its customary amount of damage to early cabbage in May. Brief mention is made of the cabbage looper (*Autographa

brassicæ), cross-striped cabbage worm (*Evergestis rimosalis*), and the harlequin cabbage bug.

Under insects injurious to cucurbits mention is made of the striped cucumber beetle and the southern corn root-worm (*Diabrotica 12-punctata*). An account of insecticides and their application concludes the bulletin.

Observations on Prays oleellus and other insects of the olive in Calabria, G. DEL GUERCIO (*Atti R. Accad. Econ. Agr. Georg. Firenze, 5. ser, 6 (1909), No. 1, pp. 31-99, pls. 4*).—*Prays oleellus* is here considered at length (pp. 33–81). Other species discussed include *Parlatoria proteus, Aspidiotus hederæ, Lecanium oleæ, Ceroplastes rusci,* etc.

Protection of woodlands in Ireland, A. C. FORBES (*Dept. Agr. and Tech. Instr. Ireland Jour., 9 (1909), No. 4, pp. 654–664, pls. 10, figs. 5*).—An account of the insects injuring forest trees in Ireland, the nature of their injury, and the practical protective measures that are often necessary to prevent serious loss.

Spraying for San José scale, M. A. BLAKE and A. J. FARLEY (*New Jersey Stas. Rpt. 1908, pp. 61–63*).—The authors report that 675 one-year-old peach trees were sprayed with lime-sulphur at an expense of $1.83. In this work the barrel pump was used, 3 men being engaged. The outlay for the equipment was $23.70.

Fumigation of apples for the San José scale, A. L. QUAINTANCE (*U. S. Dept. Agr., Bur. Ent. Bul. 84, pp. 43, pls. 2, figs. 3*).—Details of investigations conducted by the author in cooperation with W. A. Taylor, of the Bureau of Plant Industry of this Department, to determine the possibility of fumigating apples with hydrocyanic-acid and other gases, are here reported. Although the chances of the establishment in new localities of the San José scale from shipments of infested fruit are considered by American entomologists in general to be exceedingly remote, in certain European countries the danger has appeared sufficient to warrant the enactment of legislation excluding from entry all fruits from America which, on inspection, show the presence of the San José scale. Data are given from a report of the chief inspector of the station for plant protection at Hamburg which show that an undesirable amount of scale-infested fruit finds its way into our export shipments, thereby entailing a considerable loss to exporters.

A detailed description and the plans of a fumigating apparatus constructed for the work are given. The experiments conducted are reported under the headings: Strength of gas, length of exposure, package, variety of fruit, injury to fruit, and low temperature. In the fumigation of Baldwin apples loose in baskets all scales were killed with strengths of potassium cyanid at the rate of from 0.1 to 0.5 gm. per cubic foot and exposed 45 minutes, and also at the rate of 0.2 gm. per cubic foot with periods of exposure ranging from 20 minutes to 3 hours. In no instance was there injury to the fruit.

Under the package series it is reported that all insects were not with certainty killed, except in the case of fruit in boxes, wrapped and unwrapped, and in barrels in which each head had been perforated with numerous auger holes. The only variety of apple used in the tests showing gas injury was the Rhode Island Greening. Observations made at different times on fruit fumigated in a dry, moist, and wet condition showed that its condition in this respect was immaterial. Fumigation of scale-infested apples in a local cold storage plant with a temperature of 30° F. showed that adequate diffusion of the gas occurred, killing all of the scale insects without injury to the fruit. The treatment of scale-infested fruits with carbon bisulphid in strengths varying from 0.069 to 1.81 cc. per cubic foot for a period of 3 hours failed to kill the scales to any extent.

"The data presented point out, it is believed, the practicability of destroying the San José scale on apples and suggests the desirability of the adoption of the practice of fumigation by exporters if such treatment will result in the acceptance by foreign countries of fruit so treated. A certificate of proper fumigation on each barrel, box, or package should constitute a sufficient guaranty that any scales present had been killed. It is considered probable that, if desirable, fumigation could be practiced in the case of numerous fruits, as pears, oranges, lemons, etc. In the fumigation of apples in barrels it would appear sufficient to remove the upper head only, or to use for the original heading boards with numerous ¾ or 1 in. auger holes—a total of 15 or 20 at each end."

There are appended synopses of the laws and decrees in force in foreign countries bearing on the introduction of live plants and fresh fruits, and of the laws and regulations of the various States in this country bearing on the transportation and sale of fresh fruits infested with San José scale or other injurious insects.

Important insecticides: Directions for their preparation and use, C. L. MARLATT (*U. S. Dept. Agr., Farmers' Bul. 127, rev., pp. 48, figs. 7*).—In this second revision there are some changes of old formulas, necessitated by the important additions to our knowledge of insecticides since the last revision, in 1903.

Methods of exterminating the Texas fever tick, H. W. GRAYBILL (*U. S. Dept. Agr., Farmers' Bul. 378, pp. 30, figs. 15*).—Information of practical value relating to the cattle tick, including data from investigations personally conducted, has been brought together in this publication.

Following a brief description of the life history of the cattle tick, the methods of eradication are taken up and discussed at some length. Tables are given which show the time required to free pastures from ticks by starvation, and the time required for all ticks to drop from cattle placed on tick-free land. Methods of rotation by which cattle and pastures may be freed from ticks in 4, 4½, and 8 months are described and illustrated by figures. The destruction of ticks by dipping, spraying, and hand dressing is considered, directions being given for the preparation and use of crude petroleum, emulsions of crude petroleum, and the arsenical dip. Specifications and materials for a dipping vat which will hold 2,088 gal. are accompanied by drawings, and the bill of materials for the vat and draining pens.

The poultry tick, E. E. SCHOLL (*Farm and Ranch, 28 (1909), No. 36, p. 14, figs. 3*).—A brief account of *Argas miniatus* including remedial measures.

Silkworm culture in the Transvaal, D. GUNN (*Transvaal Agr. Jour., 7 (1909), No. 28, pp. 662–673*).—A brief account of and guide to silk raising in the Transvaal.

FOODS—HUMAN NUTRITION.

Foods and condiments, their preparation and adulteration, A. JOLLES (*Die Nahrungs und Genussmittel, ihre Herstellung und Verfälschung. Leipsic and Vienna, 1909, pp. 209; rev. in Chem. Ztg., 33 (1909), No. 107, p. 945; Hyg. Rundschau, 19 (1909), No. 22, p. 1308*).—In this text-book a large amount of information is presented regarding the character and manufacture of food products, food adulteration, and related topics.

Theoretical and practical treatise on frauds and adulterations, F. MONIER, F. CHESNEY, and E. ROUX (*Traité Théorique et Pratique sur les Fraudes et Falsifications. Paris: Govt., 1909, vols. 1, pp. XV+653; 2, pp. 558*).—Historical matter, legislative enactments, and similar questions are included, as well as summaries on inspection of food and beverages, standards, and related ques-

tions. The volumes as a whole constitute an exhaustive treatise on food adulteration, with special reference to French conditions.

New legislation and legislative enactments regarding fraud and adulteration, E. Roux (*Législation et Jurisprudence Nouvelles sur les Fraudes et Falsifications. Paris: Govt., 1909, 2. ed., pp. 557*).—New material has been incorporated in this summary of French pure-food enactments and legislation. A full index is provided.

Report on the work of inspectors of foods for the two years 1906–1908, G. S. Buchanan (*Ann. Rpt. Local Govt. Bd. [Gt. Brit.], 37 (1907–8), pp. 129–144*).—Information is summarized regarding the scope and extent of the food inspection work for the period covered.

Food analyses, C. F. Juritz (*Rpt. Senior Anal. Cape Good Hope, 1908, pp. 100–108*).—Analyses are reported of a number of samples of milk and other dairy products, vinegar, vinegar essence, Kafir beer, ice, Cayenne pepper, curry powder, jam, brandy and other beverages, and similar articles, a number of the analyses having been carried on in accordance with the local pure food law.

Quality in wheaten flour, A. E. Humphries (*Millers' Gaz., 33 (1909), No. 29, pp. 352–354*).—In this summary of a paper presented at the meeting of the British Association at Winnipeg, 1909, the author considers flavor, color, strength, size and shape of loaf, stability of doughs, and yield of bread per sack of flour.

Diabetic bread from soy beans and gluten, J. Chevalier (*Bul. Gén. Thér. Méd. et Chirurg., 157 (1909), p. 845; abs. in Chem. Ztg., 33 (1909), No. 100, Repert., p. 433*).—A process of making soy bean and gluten bread is described and data given regarding its composition.

The milling and baking industries, A. Maurizio (*Die Müllerei und Backerei. Hanover, 1909, pp. VIII+89*).—A popular treatise.

Electric meat curing process (*Ice and Refrig., 37 (1909), No. 5, pp. 165–167, figs. 6*).—An illustrated description of a meat curing process in which an electric current is passed through a vat containing meat in pickle (E. S. R., 21, p. 659).

Refrigeration in the meat industry (*Ice and Cold Storage [London], 12 (1909), Nos. 137, pp. 173–179, figs. 11; 138, pp. 199–206, figs. 11; 139, pp. 225–232, figs. 14*).—An illustrated discussion and summary of data regarding various questions concerned with the cold storage of meat, including the effects of freezing upon meat fibers, the transportation of frozen and chilled meat, and the transport of such meat on board ship.

Official inspection of slaughterhouses and meat products, G. Geudens (*Handel. Vlaamsch Natuur en Geneesk. Cong., 12 (1908), pp. 200–206*).—The author recommends that slaughterhouses be provided with laboratories and makes other suggestions.

The efficient inspection of Chinese pork, J. W. Green (*Brit. Food Jour., 11 (1909), No. 129, pp. 155, 156*).—Information is given regarding the importation of frozen pig carcasses and other animal food products from China into England. In view of the extent of this frozen pork trade and the conditions under which pork is produced in China, the author believes that provision should be made for rigid inspection.

The sardine industry, P. Lemy (*Ann. Falsif., 2 (1909), No. 8, pp. 264–266*).—A discussion of the adulteration of canned goods by the substitution of other fish for sardines.

Edible marine crustacea, E. L. Bouvier (*Rev. Gén. Sci., 20 (1909), No. 19, pp. 803–808*).—A summary of statistical, descriptive, and other data regarding the use of shrimp, crabs, and other sea food.

Shellfish (*U. S. Dept. Agr., Food Insp. Decision 110, pp. 2*).—The handling and marketing of oysters is discussed with reference to the Food and Drugs Act of June 30, 1906.

Quotations from the discussion follow:

"It is unlawful to ship or to sell in interstate commerce oysters or other shellfish which have become polluted because of packing under insanitary conditions or being placed in unclean receptacles. In order to prevent pollution during the packing or shipment of oysters, it is necessary to give proper attention to the sanitary condition of the establishment in which they are packed and to use only receptacles which have been thoroughly cleansed as soon as emptied. In order to prevent the possibility of contamination, it is desirable that such containers be sterilized before using.

"It is unlawful to ship or to sell in interstate commerce oysters or other shellfish which have been subjected to 'floating' or 'drinking' in brackish water, or water containing less salt than that in which they are grown. . . .

"The packing of shellfish with ice in contact may lead to the absorption by the oyster of a portion of the water formed by the melting ice, thus leading to the adulteration of the oysters with water.

"Only unpolluted cold or iced water should be employed in washing shucked shellfish, and the washing, including chilling, should not continue longer than the minimum time necessary for cleaning and chilling."

Production and trade in eggs (*Rev. Soc. Sci. Hyg. Aliment., 7 (1909), No. 6, p. XXXVIII*).—According to the information summarized, the average annual consumption of eggs per head is 118 in France, 127 in Germany, 97 in England, 94 in Belgium, and 91 in Holland.

Local sugar consumption in regard to local production (*[Bur. Agr. Stat. and Inform. Mauritius], 1909, pp. 14, chart 1*).—A summary of statistical data regarding the sugar industry in Mauritius.

Judging brandy drops and similar sorts of confectionery, Forster (*Ztschr. Öffentl. Chem., 15 (1909), No. 13, pp. 243–245*).—The alcohol content was determined of a number of sorts of bonbons containing liqueur.

Distilled liquors, Quebec, A. McGill (*Lab. Inland Rev. Dept. Canada Bul. 187, pp. 13*).—A report of analyses of 100 samples of liquors collected in Quebec and purchased as whiskey, gin, and brandy, the inspection being made "in consequence of a rumor to the effect that much spurious liquor was offered for sale in the province named. . . .

"The absence of any legal standards for spirits in Canada makes it impossible to pronounce upon the character of the samples now reported further than to say that they contain no methyl alcohol, and no substances that can be described as poisonous."

Note on the manufacture and composition of kirsch liqueurs from cultivated and wild cherries from the Fougerolles region, Roux and Bonis (*Ann. Falsif., 2 (1909), No. 6, pp. 150–158*).—Analytical data are reported and discussed.

Free tartaric acid in the wines of the Loire-Inferiéure, A. and P. Andouard (*Ann. Falsif., 2 (1909), No. 8, pp. 267–274*).—An extended study is reported of the acidity of different sorts of wine. The results are discussed with reference to wine making and the permissible limits of tartaric acid.

Analyses of Gard and Camarque wines for the years 1907 and 1908, H. Astruc and J. Mahoux (*Ann. Falsif., 2 (1909), No. 12, pp. 443–460*).—Analyses are reported of a large number of samples of wine.

Analyses of wines in accordance with the pure food law, F. Cocco-Ortu (*Bol. Min. Agr., Indus. e Com. [Rome], 8 (1909), Ser. A, No. 14, pp. 334–337*).—Analyses of a number of samples of wines are reported.

Official control of wines in Australia, C. Nourry (*Rev. Soc. Sci. Hyg. Aliment., 7 (1909), No. 6, pp. 167–170, figs. 6*).—The system of government inspection of Australian wines is discussed.

Vinegar from milk, G. Filaudeau and Vitoux (*Ann. Falsif., 2 (1909), No. 8, pp. 278–280*).—The manufacture of so-called "milk vinegar" from skimmed milk or whey is described, and an analysis of such a product reported.

According to the authors, milk vinegar, while it lacks the fine bouquet of good wine vinegars, is a wholesome and agreeable condiment, which could be used in place of some of the commercial vinegars made from alcoholic materials.

Data on the production of caffein and thein-free food products, C. Kippenberger (*Ztschr. Angew. Chem., 22 (1909), No. 38, pp. 1837–1841*).—A discussion especially with reference to a patent process of removing caffein and thein.

Deleterious ingredients of food, E. E. Smith (*Science, n. ser., 30 (1909), No. 773, pp. 569–571*).—In a paper presented before the section of biology, New York Academy of Sciences, May, 1909, the author discusses the question of food preservatives.

According to his summary, "we conclude that substances added to food are essentially injurious when incapable of serving a useful purpose in amount widely separated from the quantity that may produce deleterious effects; and that they are not essentially injurious when capable of serving a useful purpose in amount widely separated from the quantity that may produce deleterious effect, even though, in this latter instance, they may become deleterious by abuse of the quantitative relation."

Preservatives in food materials.—Their detection and effect, D. H. Bergey (*Jour. Amer. Med. Assoc., 53 (1909), No. 10, pp. 755–757*).—A series of tests was undertaken to determine with what degree of accuracy the presence of preservatives may be detected in foods by means of the antifermentative action of the preservatives on trypsin.

According to the author, "the use of the antifermentative test for the detection of preservatives in foods does not give results that are satisfactory in every particular. The employment of this test must be carried out in such a manner as to eliminate normal antifermentative effects in the food substances, and attempts to remove these normal antiferments may lead to the simultaneous removal of the preservative.

"In view of our knowledge of the detrimental effects of chemical food preservatives there is no more reprehensible practice than that of permitting their use in foods in any quantity whatever."

[The application of formaldehyde to meat], G. S. Buchanan and S. B. Schryver (*Local Govt. Bd. [Gt. Brit.], Food Rpts., 1909, No. 9, pp. 12*).—This report contains an account of the circumstances of the investigation by G. S. Buchanan (pp. 1–4), and data on the presence and detection of formaldehyde in meat by S. B. Schryver (pp. 5–12), from which the following conclusions were drawn:

"The results indicate that, in the case under consideration, formaldehyde was not readily removed from meat even when the latter had been kept for prolonged periods after formalization; that where muscular surface was exposed to the vapor, the contamination was relatively large (1 in 3,500); and that a common depth of penetration into muscular tissue was 20 mm. under a thin superficial layer of connective tissue."

Harmfulness of headache mixtures, L. F. Kebler, F. P. Morgan, and P. Rupp (*U. S. Dept. Agr., Farmers' Bul. 377, pp. 16*).—A popular summary of a report previously noted (E. S. R., 21, p. 563) discussing the character and possible harmful effects of acetanilid, antipyrin, and phenacetin.

According to the authors, "it seems advisable, in view of the widespread use of these agents in remedies sold without a physician's prescription, especially in headache mixtures, that the general public should be informed as to the nature of these drugs, their tendency to form habits, and their injurious effects, particularly their depressing action on the heart."

Prices of food products and other commodities (*Bol. Min. Indus. i Obras Pub. [Chile], 7 (1908), No. 3, pp. 45–53*).—A considerable amount of statistical data is reported regarding the prices of foodstuffs and other commodities in different localities in Chile.

Inquiry regarding the price of foodstuffs carried on in 70 schools, LEVASSEUR (*Bul. Soc. Nat. Agr. France, 69 (1909), No. 7, pp. 678–697, dgm. 1*).—Noted from another source (E. S. R., 21, p. 567).

Modern kitchen equipment on a large scale, W. STERNBERG (*Ztschr. Hyg. u. Infectionskrank., 63 (1909), No. 2, pp. 177–198*).—Historical and other data are summarized in this discussion of kitchen equipment on a large scale. The author approaches the subject from the standpoint of hospital kitchen equipment but his suggestions and generalizations have a wider application.

Cookery books, A. W. OXFORD (In *Notes from a Collector's Catalogue. London, 1909, pp. 39–109*).—A list of bibliographical data of English books on cookery and carving up to the year 1699 and also a number of titles of English cookery books published after 1700, and notes on a few foreign cookery books and on some manuscript collections.

365 orange recipes [MRS. J. L. LANE] (*Philadelphia, 1909, pp. 158*).—A collection of recipes for puddings, jams, salads, and other dishes in which oranges are used.

Care of food in the home, MARY H. ABEL (*U. S. Dept. Agr., Farmers' Bul. 375, pp. 46+II, figs. 2*).—The author in this bulletin has summarized the results of experiments and tests specially undertaken, as well as the results of experience obtained in the practical handling of such problems, and the information which is collected has been supplemented by general data gathered from a variety of sources. The questions considered have to do with the economical use in the home of products of the farm, dairy, and garden, and also with the subject of household hygiene. The subjects discussed include among others mold, bacteria, and the spoiling of food, flies, dust in relation to food, food supply, storage of food, the handling of food and utensils in the kitchen, the importance of good house plans and home conveniences, and cleanliness in public eating places.

"In conclusion it may be said that the preparation of food must more and more come to be considered as an occupation that requires of the person who undertakes it knowledge and habits quite beyond what is now expected of a person who is simply a 'good cook.'

"It is even more essential that the housewife who buys food and who attends to her own food preparation should have such knowledge."

Practical dietetics, W. G. THOMPSON (*New York and London, 1909, 4. ed. enl., pp. XXVI+928, figs. 43*).—In this volume a large amount of data has been incorporated which has accumulated since the last edition was published. As a whole the volume constitutes an extended handbook on the composition and preparation of food, characteristics of animal and vegetable foods of different sorts, cooking, digestion, dietaries, and other topics concerned with normal nutrition, in addition to the chapters which deal with diet in different kinds of disease and other special conditions, and information regarding the diet in different hospitals.

In an appendix a large number of recipes are given for preparing beverages and foods for sick room use. A detailed index to the volume is provided.

Report on national vitality, its wastes, and conservation, I. FISHER (*Bul. Com. One Hundred Nat. Health [Washington], 1909, No. 30, pp. VIII+138*).—Among the subjects taken up are the conservation of national vitality through public hygiene, semipublic hygiene, and personal hygiene, the prevalence of undue fatigue, and conservation through heredity.

The question of diet and fatigue is discussed in relation to the theory that the average protein consumption at the present time is excessive, and in the discussion investigations which in the author's opinion would support this theory are summarized.

As a whole, the bulletin is a valuable summary of statistical and other data.

Theory of nutrition based on energetics. M. BIRCHER-BENNER (*Grundzüge der Ernährungstherapie auf Grund der Energetik. Berlin, 1909, 3. ed.; rev. in Zentbl. Physiol., 23 (1909), No. 13, p. 431*).—This volume which advocates a vegetarian and more specifically a raw fruit diet, is critically reviewed by the abstractor.

The applicability of the mass-energy law to energy changes in living matter, I. H. FRIEDENTHAL (*Zentbl. Physiol., 23 (1909), No. 14, pp. 437–439*).—An introductory paper.

Regular ration of the French army: Chemical composition and energy value, L. C. MAILLARD (*Rev. Soc. Sci. Hyg. Aliment., 7 (1909), No. 6, pp. 127–166*).—In this report of the commission appointed for the study of the food of the French army a large amount of information is summarized regarding the scope of the inquiry, the methods of investigation, and the rations served and their food and energy value.

The protein in the rations of 137 regiments and battalions ranged from 125 to 195 gm. and the energy value from 3,126 to 4,590 calories, or considering the energy of digestible food, from 2,813 to 4,131 calories. As regards the principal divisions of the army, the author states that in the case of the artillery the energy value of the rations was 3,407 calories; of the infantry, 3,280; and of the cavalry, 3,160.

In his discussion of the subject the author concludes that the French army ration is deficient in protein of animal origin, deficient in fat, and contains an excessive amount of protein of vegetable origin and an excess of carbohydrates.

Army diet (*Rev. Soc. Sci. Hyg. Aliment., 7 (1909), No. 6, pp. XXXVI, XXXVII*).—A discussion of the above paper.

Analysis of prisoners' diet, H. KREIS (*Ber. Chem. Lab. Basel, 1908, pp. 39–41; abs. in Ztschr. Untersuch. Nahr. u. Genussmtl., 18 (1909), No. 7, p. 426*).—From a study covering a week it was calculated that the daily food per person supplied 109.6 gm. protein, 61.7 gm. fat, 18.3 gm. crude fiber and 465.9 gm. other carbohydrates, and 46.9 gm. ash, including 36.5 gm. salt.

A study of malnutrition in the school child (*Jour. Amer. Med. Assoc., 53 (1909), No. 9, pp. 712–714*).—A discussion of a paper by Sill, previously noted (E. S. R., 21, p. 567).

Towards social reform, CANON BARNETT and MRS. S. A. BARNETT (*New York, 1909, pp. 352*).—A number of essays on social welfare topics which have appeared at different times have been quoted in this volume. The article on the public feeding of school children (pp. 106–116) is of interest to students of nutrition.

[An old age home] (In *Copartnership in Housing. London, [1909], pp. 27, 28, pl. 1*).—An illustrated description of a home for aged persons which gives an opportunity for cooperation in baking and in laundry work.

A special object of the enterprise is to provide aged couples with quarters insuring the privacy of the home with the conveniences possible by systematic cooperation.

The ætiology of pellagra. C. H. Lavinder (*N. Y. Med. Jour. and Phila. Med. Jour., 90 (1909), No. 2, pp. 54–58*).—From a review of the literature of the subject the author believes that the following conclusions can be drawn, at least tentatively:

"The cause of pellagra is essentially unknown. The idea, in one form or another, of an ætiological relation between pellagra and the use of maize as food, is held by the majority of students of the disease. Such an idea is almost as old as the history of the disease itself. It rests to some extent upon the observations and experimental work of many able men, and in consequence, it is not to be lightly cast aside, though, at the same time, it would seem unwise to hold such views so dogmatically as to exclude investigation along other suggestive lines."

Agricultural aspects of the pellagra problem in the United States, C. L. Alsberg (*N. Y. Med. Jour. and Phila. Med. Jour., 90 (1909), No. 2, pp. 50–54*).—Various theories regarding Indian corn as a cause of pellagra are discussed.

The author believes that as a preventive of pellagra corn with a small quantity of fat, that is, with a small proportion of germ, should be cultivated as "when corn becomes moldy it is always the embryo that is affected first." Further, toxic substances formed in the embryo are thought to be a cause of pellagra. Corn, he points out, should be well grown, well ripened, and cured before marketing and grinding, and he believes that it is the dealing in moist corn which is a very important factor in the spoiling or deterioration of corn and the spread of the disease.

"The remedy is then to cause the corn to be thoroughly dried before transportation. To bring this about, corn must be sold upon a basis of its moisture content. But to make this possible there must be an efficient impartial system of grain standardization. Such a system under the complex conditions of our present civilization can, without doubt, be best carried out by the federal government. Federal grain standardization would not merely tend to restore to us our lost markets, it would not merely increase our economic efficiency, it would not merely make for higher business morals and greater commercial honesty, but it would also be a most important public health measure."

Proteins.—The relation between composition and food value, E. F. Armstrong (*Chem. News, 100 (1909), No. 2600, pp. 151, 152*).—In a paper read at the meeting of the British Association at Winnipeg, 1909, the author discusses the problem of the food value of protein on the basis of theories now held regarding its structure. He sums up as follows:

"When discussing the value of foods, it is not enough to know merely the gross amount of nitrogen-containing matter, but the nature and proportion of its constituent units must also be taken into account. The ideal diet should contain as much variety of protein as possible in order to provide sufficient of all the possible units of constructive metabolism."

The influence of sodium chlorid on the digestion and absorption of protein, C. Paderi (*Arch. Farmacol. Sper. e Sci. Aff., 8 (1909), No. 6, pp. 249–261*).—Experimental data are reported and discussed.

The influence of carbohydrates and fats on protein metabolism, E. P. Cathcart (*Jour. Physiol., 39 (1909), No. 4, pp. 311–329, dgms. 2*).—In these experiments, which were made with men, the carbohydrate diet was composed of such materials as tapioca, sugar, honey, and corn flour or of banana flour and honey; the fat diet of butter and cream; and the fat-protein diet of casein bread, cheese, butter, and eggs.

According to the author, "with a carbohydrate diet, practically nitrogen and fat free, there is a fall in the output of urinary nitrogen,

"With a fat diet, practically nitrogen and carbohydrate free, there is a marked rise in the output of urinary nitrogen.

"During starvation creatin is constantly present in the urine.

"The output of creatin induced by fasting at once falls when the diet consists of carbohydrate, whereas with the fat diet the amount excreted increases.

"The amount of creatin excreted during the fat period is not markedly reduced by the addition of protein food (carbohydrate free) to the diet.

"The hypothesis is put forward that the carbohydrates are absolutely essential for endocellular synthetic processes in connection with protein metabolism.

"It is probable that foodstuffs should be valued, as Chauveau suggested, more on account of their isoglycogenic than their isodynamic value."

The author notes that the banana flour which was made into small cakes and eaten with honey "was not on the whole very well utilized."

Lowering the rate of metabolism, R. STEHELIN (*Deut. Med. Wchnschr., 35 (1909), No. 14, pp. 609–611*).—Both fat and carbohydrates lower the metabolism of protein when taken with it, according to the author's conclusions. The paper as a whole has to do with metabolism in disease.

The Harvey lectures, 1906–7 (*Philadelphia and London, 1908, pp. 314, pls. 4, figs. 45, charts 4*).—Among the papers included in this volume several are of special interest in connection with physiological chemistry, nutrition, and related subjects, namely: The Principles of Vaccine Therapy, by A. E. Wright; The Common Bacteriological Infections of the Digestive Tract and the Intoxications Arising Therefrom, by C. A. Herter; The Myelins and Potential Fluid Crystals of the Body, by J. G. Adami; The Factors of Safety in Animal Structure and Animal Economy, by S. J. Meltzer (E. S. R., 19, p. 63); Metabolism During Inanition, by F. G. Benedict (E. S. R., 19, p. 866); and Some Recent Studies on Heredity, by E. B. Wilson (E. S. R., 19, p. 271).

Organization, work, and publications of Food and Nutrition Investigations (*U. S. Dept. Agr., Office Expt. Stas. Circ. 89, pp. 18*).—A short account is given of the organization and scope of the Nutrition Investigations of the Office of Experiment Stations, to which is appended a list of publications of the Office relating to the food and nutrition of man. In addition to the usual bibliographical data, brief notes are given in every case regarding the character of the publications listed.

The purpose of these Nutrition Investigations, as stated in this circular, is to study various aspects of the problem of the value for human food of agricultural products, both animal and vegetable.

ANIMAL PRODUCTION.

Animal nutrition problems in relation to the work of the experiment stations, C. F. LANGWORTHY (*U. S. Dept. Agr., Office Expt. Stas. Rpt. 1908, pp. 337–354*).—In this article the important progress made in the growth of scientific methods for studying the problems of animal nutrition is discussed. Recent noteworthy investigations, particularly at the American experiment stations, are cited to show how the methods of the practical feeder depending upon empirical knowledge are gradually giving way to exact methods, which can be discovered only by laboratory investigations.

Among other topics briefly treated are the chemistry of embryonic life, the need for a better knowledge of the relation of the protein requirement to the ash requirement and other factors, and the study of new or little known feeding stuffs. Lines of work are suggested which promise results of theoretical and practical importance. There are numerous references to the literature.

The problem of age, growth, and death, C. S. MINOT (*New York and London, 1908, pp. XXII+280, figs. 73*).—This book summarizes the results of investigations on the correlation of age and growth and attempts to throw light on the problems of growth, differentiation, senescence, and death by the demonstration of laws governing the proportionate volume of the nucleus and cell body in the growing organism. It is based largely on investigations of the author.

Measurements of growth, or increase of protoplasm, show very rapid gains for a short time in the early stages of an organism. A few days after birth a chick may add 9 per cent of its weight in a single day, but the rate of growth diminishes rapidly until at 2 months of age it never adds more than 3 per cent per diem to its weight and at 3 months only 1 per cent. A male rabbit the fourth day after its birth may add over 17 per cent of its weight per diem, and at 2½ months only 1 per cent. Growth curves of chickens, guinea pigs, rabbits, and human beings are given. The appendixes contain a description of an age-reckoner, data on the growth of rabbits and chickens, and related matters.

The author sums up his investigations by formulating 4 laws: "First, rejuvenation depends on the increase of the nuclei. Second, senescence depends on the increase of the protoplasm, and on the differentiation of the cells. Third, the rate of growth depends on the degree of senescence. Fourth, senescence is at its maximum in the very young stages, and the rate of senescence diminishes with age. As the corollary from these, we have this—natural death is the consequence of cellular differentiation. . . .

"If it be true that the growing old depends upon the increase of the protoplasm, and the proportional diminution of the nucleus, we can perhaps in the future find some means by which the activity of the nuclei can be increased and the younger system of organization thereby prolonged."

The "presence and absence" hypothesis, G. H. SHULL (*Amer. Nat., 43 (1909), No. 511, pp. 410–419*).—The aim of the author is to show that the dominance of "absence" over "presence" can be explained without recourse to inhibiting factors. Simple chemical experiments are cited to show that what appears to be a pair of characters is really the presence and absence of a single character. When absence dominates over presence the positive character is latent in the heterozygote. Visible Mendelian characters are always secondary and are dependent at some stage of analysis upon chemical reaction.

Inheritance of yellow color in rodents, A. L. HAGEDOORN (*Univ. Cal. Pubs., Phys., 3 (1909), No. 14, pp. 95–99*).—This is a discussion of results obtained by recent experiments on the subject.

The author thinks it probable that Castle's barring factor is in reality composed of 2 factors, one of which is the modifying factor present in the dominant strains of yellow rodents. Its action is seen in a partial inhibiting of the 2 darker pigments whenever these are present with it in one zygote, for which is proposed the name "inhibiting factor." The barring of the hairs and the body markings should then be due to the other component of Castle's barring factor, for which is proposed the name "marking factor."

The other conclusions reached are as follows: "Different strains of yellow rodents exist, the differences between the strains being due not only to pigments but also to other definite modifying factors. Yellow mice are not necessarily heterozygous. A reversion of the order of dominance does not take place. It is impossible for one pigment to dominate over another. The presence of one pigment is simply dominant over its absence. Bateson's hypothesis,

that Mendelian dominance and recessiveness are simply the effects of presence and absence of one definite determinant, is correct."

Canary breeding.—A partial analysis of records from 1891 to 1909, A. R. GALLOWAY (*Biometrika, 7 (1909), No. 1–2, pp. 1–42, pls. 5, figs. 4*).—This paper contains the results of 17 years' breeding with many types of canaries. The author considers that diversity of type has arisen from crosses between cinnamon sports and the wild green bird. This theory is advanced from (1) a study of wild sports in nature and in confinement, (2) cinnamon and cinnamon bred hybrids which frequently show characteristics of canary varieties arising de novo, (3) collateral evidence of a similar nature in poultry and pigeons, and from (4) a study of the earliest canary literature.

Mendelian inheritance in canaries is discussed at length. Dark-eye and pink-eye are found to behave generally in Mendelian fashion, for it is evident that there is a homozygous type of dark-eye canary and also a heterozygous or impure form occurring in the male as well as the female. There is some evidence that the female of the homozygous type of dark-eye canary is homozygous as well as the male. Other characters which are seen to behave as recessives are buffness and crest-bred plain-headedness; their corresponding qualities (yellowness and crestedness) exhibit more or less imperfect dominance. The majority of crests appear to be heterozygous with respect to crest.

Some of the results obtained by Davenport (E. S. R., 20, p. 1072) are stated to be different from those of the author, because of the breeding stock used by Davenport and his interpretation of fancy points. The need for a more strict definition of characters and their nomenclature is indicated. Colored plates and engravings are used to assist in improving the terminology of canary fanciers.

Note on partial leucosis in a hen, W. C. FINCH (*Biometrika, 7 (1909), No. 1–2, pp. 234–236, figs. 5*).—An account of birds which were obtained by a cross between an Indian game and a true Houdan. One hen turned from black to spotted in her first year, the spots since that time having diminished annually. Another hen has been once black, once white, then once spotted, and again white.

The rôle of inorganic phosphorus in the nutrition of animals, E. B. HART, E. V. MCCOLLUM, and J. G. FULLER (*Wisconsin Sta. Research Bul. 1, pp. 38, figs. 7*).—The investigations reported have been noted from another source (E. S. R., 21, p. 69).

The relative value of feeding stuffs, F. T. SHUTT (*Rpt. Select Standing Com. Agr. and Colon. [Canada], 1909, pp. 22–42*).—Analyses are reported of molasses, apple pomace, Paddy rice, by-products of corn, wheat, oats and peas, cotton-seed and flaxseed meals, and mixed feeds.

Registered feeding stuffs (*Kansas Sta. Feeding Stuffs Bul. 4, pp. 4*).—This contains a list of all feeding stuffs registered in the State for the year ending June 30, 1910, and also a list of manufacturers of cotton-seed meal and condimental feeds whose registrations have expired.

The Wisconsin feeding stuff law, F. W. WOLL (*Wisconsin Sta. Circ. Inform. 1, pp. 9*).—This contains the text of the Wisconsin feeding stuff law as amended by the legislature of 1909, and comments thereon. Standards of pure feeds of different kinds are suggested in order to aid manufacturers and dealers in determining the guaranties under which their various feeds may safely be sold.

A guide to the domesticated animals (other than horses), R. LYDEKKER (*London: Govt., 1908, pp. 54, pls. 8, figs. 7*).—A brief account of the different types of domesticated animals, chiefly cattle, sheep, and dogs, represented by specimens in the British Museum.

Guide to the specimens of the horse family (Equidæ), R. Lydekker (*London; Govt., 1907, pp. 42, pls. 15*).—This contains an outline of the evolution of the horse and an account of the specimens in the British Museum, which represent different types of living and extinct relatives of the horse.

On the science of hippology, E. Nicolas (*Rev. Gén. Méd. Vét., 14 (1909), No. 159–160, pp. 129–168, figs. 3*). The author explains the need for more exact information relating to the characteristics of horses, and outlines a method of procedure which should be adopted in purchasing horses to be used in the French army. Measurements and various tests should be made periodically, from the time of purchase until the death of the animal. Accurate records of the form, physiological characters, adaptability for different kinds of work, and a post-mortem examination would eventually supply data for an exact science of hippology.

The Nellore cattle, F. C. Gearhart (*Philippine Agr. Rev. [English Ed.], 2 (1909), No. 7, pp. 373–375, pl. 1*).—A brief account of a shipment of Nellore cattle from India to the Philippine Islands. It is thought that these cattle are superior to any of the indigenous breeds. Up to the present time European breeds have not proved to be of any value under natural range conditions in the Orient.

Rations for fattening swine, B. E. Carmichael (*Ohio Sta. Bul. 209, pp. 71–89*).—Young growing animals were used in all the experiments.

The following table gives the cost of gains made with different rations when fed in the dry lot, estimating corn to be worth 56 cts. per bushel, middlings $25 per ton, soy beans $30 per ton, tankage $40 per ton, and skim milk $3 per ton:

Comparison of grain rations for swine in 3 dry lots.

Number of animals.	Number of days.	Ration.	Average daily gain.	Grain consumed per pound gain.	Cost per pound gain.	Dressed weight.
		LOT 1.	*Lbs.*	*Lbs.*	*Cts.*	*Per ct.*
6	66	Corn meal	0.571	6.177	6.18	....
6	66	Corn meal and soy-bean meal 4:1	1.075	4.279	4.71	....
6	66	Corn meal and middlings 1:1	1.250	4.216	5.06	....
6	66	Corn meal and tankage	1.612	3.602	4.12	....
6	66	Corn meal and skim milk 1:2.77	2.023	2.899	4.11	....
		LOT 2.				
5	84	Corn meal	1.002	5.549	5.55	80.05
5	84	Corn meal and tankage 8:1	1.682	3.941	4.38	82.19
5	84	Corn meal and soy-bean meal 4:1	1.616	3.984	4.38	80.79
		LOT 3.				
6	56	Corn meal and tankage 8:1	1.458	4.377	....	79.32
6	56	Corn meal and soy-bean meal 4:1	1.443	4.336	....	77.53

In lot 1 the pigs did not relish the soy-bean meal mixture. In lots 2 and 3 the amount of food constituents consumed daily is estimated. Analyses of the feeds are given.

The following table shows the results of feeding different rations in the dry lot *v.* the pasture. Corn was estimated at 60 cts. per bushel and tankage at $42.60 per ton.

The experiments were made for 3 years and there were 5 animals in each lot.

Feeding tests with swine in the dry lot and at pasture in 1906, 1907, and 1908.

Number of days.	Ration.	Average daily gain.	Feed consumed per pound gain.	Cost per pound gain.
	1906.	*Lbs.*	*Lbs.*	*Cents.*
79	Corn and pasture	1.091	3.815	....
79	Corn, skim milk and pasture	1.630	2.635 corn; 8.768 skim milk.	....
	1907.			
55	Corn meal on pasture	1.396	4.674	....
55	Corn meal in dry lot	.838	5.945	....
55	Corn meal and tankage 6:1 on pasture	1.989	3.809	....
55	Corn meal and tankage 6:1 in dry lot	1.916	3.892	....
	1908.			
62	Corn meal on pasture	1.198	3.444	4.09
62	Corn meal in dry lot	.674	5.083	5.45
62	Corn meal and tankage 8:1 on pasture	1.619	3.213	4.02
62	Corn meal and tankage 8:1 in dry lot	1.574	3.478	4.14

In comparing light *v.* heavy grain rations in the dry lot there was no marked difference in the economy of gain in the different lots, but there was a wide difference in length of time required to produce a pound of pork. If concentrates are to be used exclusively a full grain ration should be fed, but if pastured, by feeding a light grain ration the hogs are induced to eat a large amount of grass with a marked economy in the production.

The following table shows the amount of grain consumed in the dry lot and at pasture:

Comparison of light and heavy grain rations with swine in the dry lot and at pasture.

Number of animals.	Number of days.	Ration.	Average daily gain per pig.	Feed consumed per pound gained.	
				Milk.	Concentrates.
		IN DRY LOT.	*Lbs.*	*Lbs.*	*Lbs.*
4	198	Corn meal, middlings, skim milk	1.277	3.934	2.588
4	198	Do. ¾ full feed	.972	3.868	2.545
4	198	Corn meal and tankage 8:1	1.785	....	4.260
4	198	Do. ¾ full feed	1.307	....	4.363
5	62	Corn meal and tankage 8:1	1.574	....	3.478
5	62	Do. ¾ full feed	1.167	....	3.520
		IN PASTURE.			
5	55	Corn meal	1.396	....	4.674
5	55	Do. ⅔ full feed	1.118	....	3.867

Three experiments were conducted to secure data in regard to the amount of tankage which could be fed to hogs in cattle feed lots. On the whole greater gains resulted from ⅔ lb. of tankage daily per pig than from only ⅓ lb.

Preparation of corn for hogs, W. J. KENNEDY and E. T. ROBBINS (*Iowa Sta. Bul. 106, pp. 305–359, figs. 13*).—During the past 2 years the question of grinding and soaking corn has been investigated by this station with 312 hogs of all ages. The conditions were much the same as are found on most Iowa farms where spring pigs are raised, the only departure from common custom being

in feeding the young pigs a full feed of corn in summer on pasture instead of a part feed as is often done. Each of the lots at pasture had a small movable hog house for shelter and shade. The grass was mostly timothy and blue grass, with a little sprinkling of fescues, cheat, and sedges, but no clovers. Meat meal was used to supply protein to all hogs that did not have access to pasture, in order to produce more rapid and cheaper gains than could be made with corn alone. The cost of shelling corn was 1 ct. per bushel, of shelling and grinding 3 cts., and of grinding corn-and-cob meal 6 cts.

Corn-and-cob meal gave the poorest results of any form in which corn was supplied. The claim occasionally made that a pound of corn-and-cob meal is equal to a pound of corn meal for pig feeding found no support in these results. When fed either dry or soaked 12 hours the cob appeared to be worse than useless. In each case when ear corn, which would have yielded 83 per cent of shelled corn, was ground into corn-and-cob meal it was found that less than 83 per cent of its weight in corn meal would produce an equal amount of pork. The wasting of feed was undoubtedly greatest with the lots getting dry corn meal.

The following table gives a summary of the 2 years' work:

Summary of results of feeding corn prepared in different ways to hogs of all ages.

Kind of corn.	Number of hogs.	Number of days.	Average daily gain.	Feed consumed.		Cost per pound gain, corn at 60 cts. per bushel.
				Corn.	Meat meal.	
SPRING PIGS STARTED AT WEANING TIME ON PASTURE.						
			Lbs.	*Lbs.*	*Lbs.*	*Cts.*
Dry ear corn	38	172	0.95	4.00	0.20	5.03
Soaked shelled corn	38	172	.94	4.06	.20	5.19
Dry corn meal	38	172	.85	4.08	.19	5.87
Soaked corn meal	38	172	.93	4.44	.20	5.79
HOGS WEIGHING 100 LBS. AT START, FED IN SPRING AND SUMMER IN DRY YARDS.						
Dry ear corn	10	140	1.32	5.66	0.49	5.33
Soaked shelled corn	10	140	1.30	5.28	.46	5.14
Dry corn meal	10	140	1.21	5.15	.45	5.53
Soaked corn meal	10	140	1.52	6.21	.54	5.32
HOGS WEIGHING 200 LBS. AT START, FED IN SPRING AND SUMMER IN DRY YARDS.						
Dry ear corn	10	84	1.74	7.40	0.74	5.41
Soaked shelled corn	10	84	1.92	7.88	.77	5.26
Dry corn meal	10	84	1.99	8.18	.81	5.44
Soaked corn meal	10	84	2.00	8.40	.82	5.55
HOGS WEIGHING 200 LBS. AT START, FED IN SUMMER ON PASTURE.						
Dry ear corn	11	45	1.31	7.13	....	6.00
Soaked shelled corn	11	45	1.42	7.18	....	5.64
OLD THIN SOWS WEIGHING 225 LBS. AT START, FED IN FALL IN DRY YARDS.						
Dry ear corn	10	56	2.04	8.14	0.59	4.84
Soaked shelled corn	10	56	2.49	9.21	.68	4.58
Dry corn meal	10	56	2.40	9.00	.65	4.75
Soaked corn meal	10	56	2.44	9.20	.67	4.80

"Shelled corn soaked 12 hours was more palatable and produced faster and more economical gains than shelled corn soaked 24 hours.

"With hogs over 200 lbs. in weight the soaking of corn was of greater advantage to those running on pasture than to those confined in dry yards.

"It proved useless to grind corn for hogs of any age when the weather was warm enough to permit soaking. In every case, where grinding has shown a saving of corn, simple soaking 12 hours in water has shown a still greater saving.

"Soaking corn meal added nothing to its feeding value for hogs that relished dry corn meal sufficiently to eat it readily in that condition. Young pigs did not relish dry corn meal so well as did older hogs.

"In general, hogs that had been accustomed to corn prepared in some form received at least a temporary check in rate and economy of gains when for any reason a change was made to dry ear corn. When the gains had been very rapid on the soaked or ground corn this effect was more marked and in some cases offset any beneficial effect of the preparation of the corn.

"These results clearly indicate the most profitable farm practice where corn was the main part of the ration for hogs. The fastest and most profitable gains were secured by feeding dry ear corn until the hogs were close to 200 lbs. in weight. The scoop shovel was all that was needed to prepare corn for them. Then if the hogs were to be fed longer, and the weather permitted, the most profitable gains were secured by changing them to soaked shelled corn. Spring pigs to be sold the next fall and winter thus gave the best results when fed dry ear corn until sold. Fall pigs and the spring pigs carried over to be fattened the following spring were handled most profitably by feeding dry ear corn until the weather became mild enough for soaking corn in the following spring, and then feeding soaked shelled corn until the finish. This was especially true when the hogs were run on pasture. The old sows made faster and more economical gains on dry corn meal than on ear corn, but the benefit from this was largely lost when it was finally necessary to ship them to market on ear corn. They were handled most profitably by feeding soaked shelled corn."

The development of swine breeding in Germany, with special reference to economic problems, A. CRONE (*Die Entwicklung der Schweinezucht in Deutschland unter besonderer Berücksichtigung der Wirtschaftlichen Fragen. Inaug. Diss., Univ. Jena, 1907, pp. 112*).—This contains a general survey of the growth of the swine industry in Germany, with statistics since 1860. Native and introduced breeds of swine are described, and there is an account of public and private methods for promoting the industry.

Baldamus' illustrated book of poultry breeding, A. BEECK (*Baldamus' Illustriertes Handbuch der Federviehzucht. Berlin, 1908, 4. ed., vols. 1, pp. XIII+871, pls. 6, figs. 205; 2, pp. VIII+407, pls. 2, figs. 133*).—This treatise on poultry breeding for pleasure and profit is a revised edition of a work originally written by A. C. E. Baldamus.

The first volume contains a short sketch of the history and present status of the poultry industry, an account of poultry associations and other measures for encouraging the poultry industry, and of the management of poultry, and descriptions of the different breeds of fowls, bantams, peafowl, guineas, pheasants, and turkeys of all countries, including frizzled, rumpless, short-legged, and bald-necked fowls, prairie hens, Curassow, and other little known varieties of poultry. The second volume treats of pigeons, ducks, geese, and swans.

Chickens, and how to raise them, A. T. JOHNSON (*Philadelphia, 1909, pp. 159, figs. 26*).—A popular work on poultry, which contains discussions of practical methods of rearing the chickens, managing incubators, the common diseases of fowls, and related topics.

Notes on the behavior of the domestic fowl, P. B. HADLEY (*Amer. Nat., 43 (1909), No. 515, pp. 609–676, fig. 1*).—An account of an acquired habit of an adult Buff Rock cockerel of so manipulating an automatic feeder containing bran, corn, and whole wheat as to secure a larger proportion of the corn and wheat.

The marketing of eggs, H. V. HAWKINS (*Jour. Dept. Agr. Victoria, 7 (1909), No. 9, pp. 569–571*).—Practical hints are given on producing, grading, and marketing strictly No. 1 eggs. Not only should eggs for market be fresh but also they should not be exposed for any length of time to the sun, dampness, or unsavory odors. Dirty, misshapen, or doubtful eggs should not be sent to market.

Studies of natural oyster propagation at Barnegat, 1908, J. NELSON (*New Jersey Stas. Rpt. 1908, pp. 149–177, pls. 6*).—This is a continuation of earlier studies (E. S. R., 19, p. 1073).

The length of time which elapses between spawning and spatting was found to depend on the temperature of the water. At a temperature ranging between 70 and 75° F., the fry required about 3 weeks to mature to the spatting stage. At a temperature ranging from 75 to 80° the period is only 2 weeks in length. This result has great importance, because the nearer the planter can place his cultch to the date when a batch of fry is setting as spat, the better will be his catch of seed. The proper time can be estimated with approximate accuracy by opening oysters each week, particularly at the close of a warm spell during June or during July, until it is seen that the majority of the oysters have completed spawning. Then if the average temperature of the water for a period of 10 days is below 75°, the shells should be in place 3 weeks from the date when spawning was completed; but if the average is above 75°, the length of the waiting period should be only 2 weeks. In no case should the cultch be planted before the oysters have spawned, as it will become coated with a slime that will prevent the spat from adhering.

The best shells collected as many spat after being out a single night as did other shells that were simultaneously exposed, but that were out long enough to include the daylight period either before or after. There was a vast difference between different clean shells newly placed in power to attract spat, but very little difference between the spat-catching power of the 2 sides of the shell except in the case of the outer surface when placed on the bottom of a floating box. While the shell was in the position in which it naturally falls when planted, that is, with the hollow side up, the outer or lower surface caught twice as many spat as in the reverse position; while the hollow side caught an equal number in either position. This result is deemed rather surprising, as when a shell lies in its natural position, it is in a reverse position from that of the tiles as placed in European oyster culture. Independent comparison of the two surfaces, by taking all cases, showed an average of 18 spat per shell on the hollow side for all positions, and 14 spat for the outside in all positions. In actual practice the planted shells collect much mud on the hollow upper side, yet as a rule most of the spat are found on that side on the exposed rim.

The fry were not abundantly present in water of less degree of saltness than 1.008 specific gravity, which means either that fry can not live long in water fresher than this, or that the adult oysters do not spawn in water fresher than this. It becomes important therefore in making new artificial oyster beds to study the saltness of the water at the proposed place, if there are no natural beds in the vicinity.

The methods of filtration and making experimental cultch are described. Data on spawning, development, and spatting are presented in graphic and tabular form.

DAIRY FARMING—DAIRYING.

Milking machines: Effect of method of handling on the germ content of the milk, H. A. Harding, J. K. Wilson, and G. A. Smith (*New York State Sta. Bul. 317, pp. 253-292, pls. 4*).—This bulletin reports original investigations with milking machines and reviews other investigations on the same subject.

The point that is emphasized by these studies is that the quality of milk obtained from the milking machine depends largely upon its care and manipulation. "The most important item in this connection is the careful immersion of the milking parts in a brine or similar solution between milkings. This has been shown to be many times more efficacious than the most careful steaming. While there is room for improvement in this particular, a 10 per cent solution of common salt is fairly satisfactory for immersing the tubes. The limit to which the germ content of the milk can be reduced turns largely upon the efficiency of the air filters and these have varied widely upon the different types of machines which have been studied."

The trials with the Globe milking machine in 1906 did not remove all of the milk and the bacterial count was abnormally high. Later trials, reported in this bulletin, were with the B-L-K machine.

When the teat cups and rubber parts were immersed in a 10 per cent salt solution between milkings the number of germs per cubic centimeter averaged 17,086; when not so immersed, 188,580. An inspection of the tubes in the preliminary work showed that they contained air in considerable quantities. Thereafter the condition of the tubes was inspected at 10 o'clock each day on which samples were to be collected at the night milking, and the air which was practically always found in the tubes was expelled. Later an attempt was made to measure the effect of allowing air to remain in the tubes, and it was found that when the air was excluded the count was 1,990; when left in the tubes, 4,740.

In experiments with cotton filters when the vacuum was broken at the stanchion cock the germ content on the suction filter side was 19,856, and on the other side 8,290. Without the filter the figures were 51,600 and 12,650, respectively. In using cotton filters when the vacuum was broken through the teat cocks the germinal count on the filter side was 4,383; on the other side 7,764. Without the filters the counts were 10,758 and 7,177, respectively. These results indicate that the larger suction filter is capable of removing the germs from the air which rushes in at the time the stanchion hose is removed from the stanchion cock.

Later experiments were made with a new type of machine in which no unfiltered air was admitted to the milk chamber, and in the relief filters the cup for cotton was much larger than in the type used in the previous experiments. With this machine the average bacterial count was 3,210 as compared with 8,340 with the older type. Two later machines were tested which differed from the preceding form in that they did not have a relief filter on the dome of the milking machine, and the relief filters at the teat cup connectors had correspondingly larger openings for the entrance of air. In one of the machines the filter was in the form of a cone, which admits the air into the teat cup connector in front of the opening coming from the forward pair of teats. The filtering cotton was prevented from entering this cone by a perforated sheet of metal. The object of this change was to equalize the milking action of the 4 teats. The test was intended to determine whether this change in form influenced the filter action when the capacity of the filter remained constant. The results were slightly better on the average with the filter supplied with a cone, but the difference was not marked.

A test was made of the effect of filling only the suction filter cup with cotton and contrasting this with the results where the cotton was not used. With the cotton the count was 4,405; without the cotton, 16,185. These results indicate that where the dairyman does not feel that there is sufficient time to fill all the filter cups with cotton the maximum benefit will be obtained by filling the suction filter.

A comparison was made of the relative filtering efficiency of absorbent and ordinary cotton, but there was no observable difference. Carrying the pail to the barn with the top removed increased the bacterial count, as was to be expected. Also, disconnecting the parts to rearrange the teat cups when changing from one cow to another only occasionally increased the germ content to a marked extent.

Milking machines and clean milk, F. H. HALL (*New York State Sta. Bul. 317, popular ed., pp. 10*).—A popular edition of the above.

The production and handling of clean milk, K. WINSLOW (*New York, 1909, 2. ed., pp. 367, pls. 18, figs. 85*).—In this edition much of the original text (E. S. R., 19, p. 779) has been revised. The following new chapters have been added: Essentials of Milk Bacteriology, Quantitative Bacterial Analysis of Milk, Media Making and Apparatus Required for Bacterial Analysis of Milk, and Classification and Identification of Bacteria, by H. W. Hill, and Laboratory Work in Dairy Bacteriology, by H. W. Conn.

The score card in dairy regulation, G. H. GLOVER (*Hoard's Dairyman, 40 (1909), No. 41, pp. 1197, 1209*).—It is pointed out that the score card for dairy work should be adapted to suit local conditions as the different items do not have the same relative significance in all places. "Ten points allowed for cleanliness of cows is just as important in Colorado as it is in Chicago, but 22 points allowed on stables is not, for the reason that dairy cows in Colorado are only kept in stables while they are being milked for one-quarter of the year. Again, the cooling of milk is just as important in Colorado as in Chicago, but the tuberculin testing of cows has not the same importance because there is much less of tuberculosis among cattle in the arid West."

The author has devised a score card in which he reserves 20 points out of equipment for general conditions in order to have a greater freedom in allowing for local conditions.

Disinfection of a large dairy premises and many employees after scarlet fever, C. E. NORTH (*Engin. News, 62 (1909), No. 4, p. 106*).—Details are given of the method of disinfecting the employees and premises of a large dairy after 2 cases of scarlet fever had been discovered among the employees.

The milk was pasteurized each day in order to give consumers absolute safety from infection without interrupting the operation of the plant. The dairy house, dairy utensils, and dormitories for the employees were disinfected, and the dormitory disinfection was tested by control cultures of bacteria. The employees were disinfected, provided with sterilized clothing, and their throats and noses examined daily by the visiting physician. At the end of 15 days, no other cases having been discovered, the pasteurization of the milk was discontinued.

Directions for the home pasteurization of milk, L. A. ROGERS (*U. S. Dept. Agr., Bur. Anim. Indus. Circ. 152, pp. 2*).—This circular describes a simple outfit for the home pasteurization of the milk delivered in the cities in the summer months which is to be used chiefly for children.

Leucocytes in milk: Methods of determination and the effect of heat upon their number, H. C. CAMPBELL (*U. S. Dept. Agr., Bur. Anim. Indus. Bul. 117, pp. 19*).—The experimental work reported was conducted in cooperation with the Pennsylvania state live-stock sanitary board.

The Stoke, Stewart, Trommsdorff, and Doane-Buckley methods of determining leucocytes in milk are described and compared. In 20 samples of market milk these methods showed a certain, although not a uniform relationship. When one ran high the others usually also showed a high count. Streptococci were found either on staining the sediment or on the agar plates in each of the 20 samples examined.

In all samples taken in a careful manner from a young cow in her first lactation period the leucocyte count and the percentage of sediment was very low, considered with relation to the standard. No streptococci were found either on examinaton of the sediment or on the agar plates. In the majority of samples from a cow having inflammation of the udder streptococci were found either in the sediment or on the agar plates. There seemed to be some relation between the presence of the streptococci and the number of leucocytes.

The fore milk, middle milk, and strippings, both unheated and heated to 70° C., were studied, and 40 out of 42 samples examined showed a much larger number of cells in the heated samples than in the unheated. A number of samples were also examined at different temperatures in order to observe at what point the change in the apparent leucocyte content occurred.

"The most satisfactory results were obtained between 60° C. and 70°. There was an increase at 80, 90, and 100°, but the results were not so uniform and the examination was much more difficult to make on account of the coagulated albumin, which interfered with the count. At the high temperatures the leucocytes were more or less disintegrated and could not be so easily differentiated from foreign material, hence the count was rendered less reliable.

"In pasteurized milk the leucocyte count is usually higher than in raw milk; therefore it was thought desirable to examine a series of four tubes from the same sample. The first tube was unheated; the second was heated to 70°; the third was heated and then cooled, and kept at 15° for twenty-four hours; the fourth was heated, then cooled, kept at 15° for twenty-four hours, and then heated again. . . . In every instance after the milk was once heated the cooling did not bring it back to its original condition, while the second heating to 70° C. did not increase the count over the first heating. . . .

"It appears that heating is as essential as any other part of the technique in determining as nearly as possible the number of cellular elements in milk.

"Since heating greatly increases the number in the count of the leucocytes, it seems necessary that a higher leucocyte standard shall be adopted in judging milk."

Bacterium lactis acidi and its sources, W. M. ESTEN (*Connecticut Storrs Sta. Bul. 59, pp. 5–27, figs. 5*).—This is a continuation of investigations previously noted (E. S. R., 20, p. 178). It gives a brief résumé of the economic importance of *B. lactis acidi*, and reports investigations concerning the source of the organism.

Except in cases thought to be accidental, this species was not found in different soils or hays, on leaves of trees and plants, or on grass. Of the grains tested, cotton-seed meal, gluten bran, middlings, mixed feed, and corn meal, only the corn meal contained a lactic-acid bacterium. Several parts of the surface of the human body were tested, but no positive results were obtained until the inside of the mouth gave evidence of a large colonization. The bacteria were present in the feces of 11 out of 25 cows, but seemed to be somewhat modified, having but little power to curdle milk.

The organisms were found in abundance in the mouths and on the exterior of nearly all the cows and in the feed troughs and mangers. In a few cases the results were questionable, but it was thought that a repetition would give positive results. Evidently the cow's mouth is the most abundant source of the

organism, although it may be considered a harmless parasite there and possibly of the stomach and intestines. The intestinal origin of the organism is probably from the mouth.

The evidence seems to prove conclusively that all objects which are reached by the tongue of the cow are an abundant source. Apparently, there are two or more types of this organism and it is thought that these investigations, which throw light on its origin, may assist in its classification.

The propagation of pure starters for butter and cheese making, E. G. HASTINGS (*Wisconsin Sta. Bul. 181, pp. 3–17, figs 4*).—This bulletin discusses the sources of flavor in butter and cheese, and describes apparatus and methods of preparing starters for both butter and cheese making.

The propagation of pure culture starters for butter and cheese making, E. H. FARRINGTON and E. G. HASTINGS (*Wisconsin Sta. Circ. Inform. 2, pp. 4*).—A popular summary of the above.

On the properties and significance of slime-producing lactic-acid bacteria in the manufacture of Emmental cheese, R. BURRI and J. THÖNI (*Landw. Jahrb. Schweiz, 23 (1909), No. 4, pp. 227–314*).—Further studies are reported of *Bacterium güntheri* and other species of bacteria (E. S. R., 16, p. 197) which are found in the curd of Emmental cheese.

When slimy fermentations occur the viscosity of the curd prevents the escape of the whey. Clusters of irregular shaped holes are formed. The cheese mass acquires a more or less strong taste and the rind frequently cracks. Several lactic-acid forms which produce the trouble were found to be the same species as those found in normal cheeses, which indicates that strictly lactic-acid forms can under certain circumstances enter into a slimy condition and in this state are more resistant to heat. Artificial inoculations of the slime-forming bacteria produce the defects which sometimes occur in practice.

The results obtained confirm earlier work in establishing a close relationship between *B. günthcri* and pathological and nonpathological streptococci. *Bacillus casei* δ and *B. casei* ϵ, though closely related, could be distinguished by their behavior toward saccharose. The presence of these injurious forms can be detected in the factory by taking samples of whey containing granules of curd from the cheese kettles and keeping them at 30 to 38° C. If present, the slimy curd will appear in from 24 to 36 hours. The bacteria have a wide distribution but cause no harm unless present in large numbers, in which case the milk cans and dairy utensils should be thoroughly sterilized. If present in the rennet, the supply should be obtained from another source.

Contribution to the knowledge of the bacterial flora of Emmental cheese in different stages of ripening, J. THÖNI (*Landw. Jahrb. Schweiz, 23 (1909), Nos. 7, pp. 395–421; 8, charts 3*).—This is a study of the bacterial flora of the inner and outer portions of cheeses at different periods during the process of ripening. The bacterial counts at different stages are presented in graphical form.

The interior portion contained a larger number of microbes in the fresh cheese mass than in any later stage and these consisted chiefly of lactic-acid bacteria and cocci. In the cheeses of normal size the cocci were more numerous than the lactic-acid forms during the first day, but in the small cheeses the lactic-acid forms predominated from the start. Other organisms found included aerobic spore-forming, coli aërogenes and proteus groups, *Bacterium casei limburgensis*, *B. zopfii*, *Cladosporium butyri*, and yeasts. The organisms present in the rind were more numerous than in the interior and consisted chiefly of cocci and *B. casei limburgensis*, although yeasts, *B. casei*, and aerobic spore-forming bacteria were present. The natural rennet cheeses differed from the artificial rennet cheeses by a higher germ content in the fresh cheese mass, and in the predominance of long

rod forms of lactic-acid bacteria from the beginning, and produced a better ripened cheese with better flavor and aroma.

The participation of obligate anaerobic spore-forming putrefactive bacteria in the normal ripening of Emmental cheese, R. BURRI and J. KÜRSTEINER (*Landw. Jahrb. Schweiz, 23 (1909), No. 7, pp. 422–484*).—The authors review previous contributions by different investigators on the much discussed problem of whether or not strictly anaerobic spore-forming putrefactive bacteria are essential in the ripening of hard cheeses, and report recent experiments of their own with *Bacillus putrificus coli* and *B. paraplectrum fœtidum*, which are of this group.

These organisms in the spore form, which were found to be of common occurrence in the air of the cow stables and in milk, are very resistant to moist heat. They remain largely in the spore form in the cheese and their number is insignificant compared to that of the lactic-acid forms. When added to cheese milk they produced no abnormal result and did not increase to any appreciable extent during ripening because of the acidity. For these reasons the authors do not agree with Rodella (E. S. R., 17, p. 1010), that they participate in the ripening of hard cheese.

A bibliography is appended.

Monilia nigra as the cause of black spots in Emmental cheese, R. BURRI and W. STAUB (*Landw. Jahrb. Schweiz, 23 (1909), No. 8, pp. 487–522, pls. 2, fig. 1*).—Black spots of irregular shape and size, up to 2 cm. in diameter, were noticed on the rind of Emmental cheese. The cheese mass in the vicinity of the spots was dry and crumbly, a condition which extended for some distance into the cheese.

A microscopical examination revealed the presence of bacteria, yeast, and an unknown species of fungus with yeast-like cells 10 to 16 microns long, and hyphæ containing a brownish-black coloring matter. In pure cultures the fungus formed yeast-like buds, yet developed into organisms with branching hyphæ, although no conida or other spores were observed. Its growth was checked by alcohol and by formalin but not by salt. It was able to produce fermentation with dextrose and saccharose. The formation of the black color was considered to be due not to enzyms but to a purely chemical process. The authors named this new species *M. nigra*.

The manufacture of whey butter, G. KOESTLER and F. MÜLLER (*Landw. Jahrb. Schweiz. 23 (1909), No. 9, pp. 529–552*).—The investigations reported in this article have been noted from another source (E. S. R., 21, p. 678).

VETERINARY MEDICINE.

Laboratory methods for the experimental study of immunity, E. F. MCCAMPBELL (*Columbus, Ohio, 1909, pp. 196*).—In this laboratory guide, the author takes up those general topics in connection with the phenomena of immunity with which the student of experimental medicine must be familiar before attempting to investigate any of the more important problems of immunopathology.

Studies in immunity (*New York and London, 1909, pp. VII+545, pl. 1*).—The writings on this subject by J. Bordet and his collaborators, including Gengou, Sleeswijk, and Streng, have been collected and translated by F. P. Gay. A General Résumé of Immunity, written by Professor Bordet expressly for this publication, concludes the work.

A text-book upon the pathogenic bacteria for students of medicine and physicians, J. MCFARLAND (*Philadelphia and London, 1909, 6. ed., rev., pp. 709, pls. 3, figs. 201, charts 2*).—A thoroughly revised edition of this work (E. S. R., 18, p. 674).

A new bacteriological method of meat examination, H. Conradi (*Ztschr. Fleisch u. Milchhyg., 19 (1909), No. 10, pp. 341–345; abs. in Jour. Compar. Path. and Ther., 22 (1909), No. 3, pp. 260–263*).—The method here described necessitates a close acquaintance with bacteriological methods and the possession of such appliances as are to be found in most small bacteriological laboratories. It depends upon the principle of developing the isolated micro-organisms present in the organ to be examined while preserving the specimen from accidental contamination or fresh infection.

Further report upon the presence of the Gärtner group of organisms in the animal intestine, W. G. Savage (*Ann. Rpt. Local Govt. Bd. [Gt. Brit.], Sup. Rpt. Med. Officer, 37 (1907–8), pp. 425–444; abs. in Jour. Roy. Micros. Soc. [London], 1909, No. 5, p. 628*).—The author shows from his observations that it is convenient to recognize a more exclusive enteritidis group (type organism *Bacillus enteritidis* Gärtner) as a subgroup of the larger group containing organisms of the Gärtner type. Members of the Gärtner group with the characters of the recognized pathological members of this group are not found in the healthy animal intestines of the ordinary domestic animals used for food. Organisms which superficially resemble bacilli of the Gärtner group, both *B. paratyphosus* (*b*) and (*a*), are met with in small numbers. There is no evidence that these Gärtner simulating organisms found in the healthy intestine are of any pathological significance. By extended cultural study they can be differentiated from the true meat-poisoning bacilli.

The pathology of the suprarenal glands of domestic animals, A. F. Fölger (*Monatsh. Prakt. Tierheilk., 20 (1908), No. 4, pp. 145–192, pls. 4, figs. 16; abs. in Vet. Rec., 21 (1909), No. 1086, p. 746*).—The author has made an extensive study of the pathological anatomy of the suprarenal glands. He concludes that the importance of these glands is not yet fully realized in pathology, and that a careful examination of them, in autopsies in which the origin of the disease is problematic and especially if the illness has been marked by a loss of vital power, convulsions, and disturbances of digestion, might clear up many obscure questions.

Metastases, suppurative inflammation of the suprarenal glands and, in cows, tuberculosis, are among the conditions described. Tumors of these bodies are apparently commoner than has hitherto been supposed. In 300 horses the author found 46 such tumors, these being chiefly in old horses. The most important of these tumors are hypernephroma, melanosarcoma, and capillary telangiectasis, or vascular tumor consisting of enlarged and dilated blood vessels.

The farmer's veterinarian, C. W. Burkett (*New York, 1909, pp. X+275, pls. 7, figs. 50*).—A practical treatise on the diseases of farm stock.

Stock diseases [in New Zealand], C. J. Reakes (*Rpt. Bien. Conf. Agr. and Past. Assocs. New Zeal., 8 (1909), pp. 58–64*).—An address by the chief government veterinarian on the diseases of sheep, horses, and cattle.

Compared with older countries, New Zealand is considered fortunate in being free from many serious diseases affecting live stock generally, and also in having, by comparison, only a small portion of its animal population affected with the specific diseases which have gained a foothold. Exceptions to this, however, are contagious abortion and contagious mammitis of cows.

The bacteriological diagnosis of anthrax by cultures from the skin, A. Ciuca and G. Stoicesco (*Compt. Rend. Soc. Biol. [Paris], 67 (1909), No. 25, pp. 140, 141*).—Previously noted from another source (E. S. R., 22, p. 81).

Demodex folliculorum, F. Gmeiner (*Berlin. Tierärztl. Wchnschr., 25 (1909), No. 38, pp. 695–700; abs. in Vet. Rec., 22 (1909), No. 1112, pp. 291–293*).—This article is said to be a summary of the author's investigations upon the *D. fol-*

liculorum of man and dogs, the details of which have been previously published in 2 works.

The cutaneous and ophthalmic reactions in glanders, DIETRICH (*Arch. Wiss. u. Prakt. Tierheilk., 34 (1908), No. 3, pp. 246–257; abs. in Jour. Compar. Path. and Ther., 22 (1909), No. 3, pp. 257, 258*).—In his experiments, the author found that the cutaneous and ophthalmic reactions with mallein gave no positive results in 10 glandered guinea pigs, though the results were also negative in the case of 6 healthy ones. Six of 13 glandered horses gave a positive ophthalmic reaction but 2 of the 6 gave reactions of the second degree only. No horse gave a positive cutaneous reaction and a healthy horse gave negative results to both tests. The cutaneous and ophthalmic reactions are therefore deemed so unreliable in glanders of the horse and guinea pig as to possess no practical value for the purpose of diagnosis.

Biochemical and therapeutical studies on trypanosomiasis, A. BREINL and M. NIERENSTEIN (*Ann. Trop. Med. and Par., 3 (1909), No. 3, pp. 395–420*).—This is a detailed report of observations on experimental trypanosomiasis, the treatment of infections with different pathogenic trypanosomes, and the mechanism of the therapeutical action of various trypanocidal compounds.

Comparative studies of the tubercle bacillus of man and of the domestic animals, W. ZWICK (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 4 (1908), Nos. 3–4, pp. 161–200, pl. 1, figs. 2; 5–6, pp. 321–373; abs. in Bul. Inst. Pasteur, 7 (1909), No. 9, p. 398*).—Comparative studies of the tubercle bacillus are here reported in detail. A bibliography of 102 titles is appended.

Some properties of tubercle bacilli of bovine origin cultivated on glycerinated beef bile, A. CALMETTE and C. GUÉRIN (*Compt. Rend. Acad. Sci. [Paris], 149 (1909), No. 18, pp. 716–718*).—Experiments have shown that when guinea pigs are inoculated with bacilli cultivated in this way a much greater virulence is developed, although this becomes steadily diminished by successive cultures. Further experiments, on horses and heifers, have shown that with the former the virulence is not only increased but remains so, while with the latter there is the decreasing virulence observed in the guinea pig.

Bacteriolysis of tubercle bacilli, G. DEYCKE and H. MUCH (*München. Med. Wchnschr., 56 (1909), No. 39, pp. 1985–1987; abs. in Jour. Roy. Inst. Pub. Health, 17 (1909), No. 11, p. 687*).—Although previous attempts by many workers to find a method of dissolving tubercle bacilli in order to obtain those substances that could stimulate the production of effective specific antibodies, had been without avail, the authors report success with lecithin, cholin, and neurin, the last-named proving particularly effective. When to 2 cc. of a 25 per cent solution of neurin 0.5 cc. of a thick emulsion of tubercle bacilli was added, a minute after the addition was made a clearing up of the mixture was observed while the control mixture made with normal salt solution or distilled water remained thick and turbid. It was possible to follow out, under the microscope, the stages of the dissolution of the tubercle bacilli.

Tuberculosis and its detection (*Iowa Sta. Bul. 107, pp. 361–390, fig. 1, charts 6*).—In part 1 (pp. 364–382), C. H. Stange briefly considers the methods commonly used in the detection of bovine tuberculosis. He reports in detail tuberculin tests and subsequent post mortems made of the college herd, the temperature charts of reacting animals being given.

In part 2 (pp. 383–387), W. J. Kennedy and W. Dinsmore report experiments upon the transmission of tuberculosis from cattle to hogs. It was found that 22 of 28 healthy pigs, kept in a pasture for about 3 months to clean up after a carload of cows affected with tuberculosis, had unmistakable lesions of the disease when slaughtered a short time after removal. Of the 22 tuberculous hogs, the liver was affected in 9 cases, the mesenteric glands in 6, and each other

organ which is ordinarily liable to infection was diseased in 2 or more cases. In 17 of the cases which were only slightly infected the diseased portions were removed and the remainder used for food, but 2 had so many internal organs affected that they could not be safely used for anything but lard, and 3 had the disease so generalized throughout the body as to be unfit for domestic uses of any kind. None of the hogs had been with the tuberculous cattle more than 7 weeks and all were slaughtered in $3\frac{1}{2}$ months from the time they were first put with the cattle. Of a check lot of 6 smaller and less thrifty pigs fed in a dry lot on corn alone, all were found to be free from any signs of the disease. Brief mention is made of an experiment previously noted (E. S. R., 19, p. 377), which showed that hogs fed milk containing virulent bacilli of bovine tuberculosis are very certain to become quickly and seriously infected with the disease.

In part 3 (pp. 388–390), W. J. Kennedy and W. Dinsmore report that from 9 cows retained from the tuberculous herd at the college and held under quarantine, 6 calves were reared. All were allowed to nurse their dams about 6 months and were then weaned and tested. But 1 calf developed tuberculosis and this was from a dam far advanced in the disease.

The combined tuberculin test for cattle, A. R. Littlejohn (*Jour. Compar. Path. and Ther.*, *22* (*1909*), *No. 3*, *pp. 217–237*).—The details of a comparison of the simple conjunctival test, the subcutaneous or general test, and the combined test are reported in tabular form.

Of 64 cows that were tested, 26 reacted as tuberculous to the subcutaneous test. Of these, 3 failed to give any conjunctival reaction before the subcutaneous injection, and 7 gave a very slight reaction. All the 26, however, gave a conjunctival reaction after the subcutaneous injection. One cow out of the 64 tested gave a marked conjunctival reaction before and after the subcutaneous injection, but failed to react to the subcutaneous test. In a study made of the 26 which reacted it was found that the instilled eye gave a positive reaction most commonly on the fifth day, there being fewer nonreacters and the largest number of marked reacters on that day. Studies of the results at the ninth, twelfth, and fifteenth hours after the subcutaneous injection showed that the instilled eye gave a marked reaction at the fifteenth hour in every case but one, and that case had been marked at the ninth hour, and also that about half the cases gave a muco-purulent reaction throughout the ninth, twelfth, and fifteenth hours.

From these tests it is concluded that the simple conjunctival test does not appear to be as reliable as the subcutaneous test, but that the combined conjunctival test is apparently quite as reliable.

Researches on the immunization against tuberculosis, H. Vallée (*Ann. Inst. Pasteur*, *23* (*1909*), *Nos. 8*, *pp. 585–603*; *9*, *pp. 665–676*, *charts 7*).—This is a detailed account of experiments conducted since 1903, in which 166 grown cattle and 500 calves were used.

The best results were obtained with intravenous inoculation of living tubercle bacilli of a much attenuated strain derived from a horse. The slight virulence of this strain and its complete absorption after inoculation are important factors in the results obtained. Inoculation with killed bacilli never produced satisfactory results. Ingestion of the cultures by the mouth conferred temporary immunity, the more complete the younger the animal. Vaccination by the mouth permitted the young cattle to resist for a year close contact with other cattle with open lung tuberculous lesions, and after 2 years' intercourse with infected animals they presented only insignificant or hidden lesions, while the control animals showed signs of severe and advanced tuberculosis.

This vaccination by the mouth of the young cattle supplemented by the elimination of all cattle with open tuberculous lesions is thought to open a prospect for a simple, safe, and certain method of eradication of tuberculosis from cattle. The attempts to hyperimmunize the horse by means of living tubercle bacilli of human and bovine types are thought to be the first to have been made. Of 11 horses injected in the course of 5 years, 3 died accidentally and 4 were slaughtered but no trace of tuberculosis could be detected in any case while the serum of all had evidently acquired limited specific qualities adapting it for human vaccination.

Vaccination of cattle against tuberculosis with nonvirulent bacilli, KLIMMER (*Ztschr. Tuberkulose, 12 (1908), Nos. 5, pp. 353–383; 6, pp. 487–518; Centbl. Bakt. [etc.], 1. Abt., Ref., 43 (1909), No. 1–5, pp. 10–18*).—Investigations of the resistance of vaccinated cattle to natural and artificial infection are reported in detail. See also a previous note (E. S. R., 20, p. 480).

Report upon the bacteriology and pathology of garget in cows, W. G. SAVAGE (*Ann. Rpt. Local Govt. Bd. [Gt. Brit.], Sup. Rpt. Med. Officer, 37 (1907–8), pp. 359–424; abs. in Jour. Roy. Micros. Soc. [London], 1909, No. 5, p. 627*).—The author finds that this affection in cows is due either to streptococci, staphylococci, or *Bacillus coli*, but chiefly to streptococci of a definite type spoken of as *Streptococcus mastidis*. The characters of this type are long twisted chains staining by Gram's method and producing acid in milk and clot within 3 days at 37° C. Acid is produced in lactose and in saccharose media, but never in mannite and not usually in salicin, raffinose, or inulin. They are nonpathogenic for mice on subcutaneous injection. They grow rapidly but readily die out in ordinary broth. Infection apparently arises by an upward invasion of the udder through the teats.

The prevention of milk fever (*Abs. in Vet. Rec., 21 (1909), No. 1094, pp. 867, 868*).—Various continental authorities regard the milking out of the cow immediately after calving as an important cause of milk fever. Siegel, of Norway, advises that the cow should not be milked by hand at all, the calf being left to suck. Sahlmann and Dommerhold, district veterinary surgeons, in Germany and Holland, respectively, disagree with this, holding that the calf should receive the necessary colostrum as soon as possible after birth and not wait until driven to suck by hunger. Their advice is, after calving, to draw just so much milk as is required for the calf and abstain from further milking.

Dommerhold reports that this method has been tested for some years in Holland with satisfactory results, especially in the province of Friesland, which contains not only the most milch cows but also the best. He explains its success in preventing milk fever by the continental theory that the disease is due to a cerebral anemia which is induced by the disturbance of the circulation caused by the milking out of a distended udder. Plenitude and distension of the udder, no matter whether it is filled with potassium iodid solution, saline solution, air, or milk, regulates the circulation and so prevents the cerebral anemia of milk fever or corrects it if present. He also mentions as another beneficial effect of infusions of air that the thick venous blood becomes thinner under the influence of air and thus flows away more easily.

Preliminary note on the transmission of East Coast fever to cattle by intraperitoneal inoculation of the spleen or portions of the spleen of a sick animal, K. F. MEYER (*Jour. Compar. Path. and Ther., 22 (1909), No. 3, pp. 213–217, fig. 1*).—The author's experiments appear to show that East Coast fever can be artificially transmitted through intraperitoneal inoculation of large and intact portions of spleen.

Cattle plague in China, H. E. KEYLOCK (*Jour. Compar. Path. and Ther., 22 (1909), No. 3, pp. 193–213*).—An account of the author's experience with rinderpest which appears to be indigenous to the whole of China.

Diurnal variations in the temperatures of camels, J. B. CLELAND (*Proc. Linn. Soc. N. S. Wales, 34 (1909), pt. 2, pp. 268–271*).—The author has found that there is a wide variation in the temperatures of camels varying with the external conditions, the oscillations sometimes being nearly as much as 8° F.

Echinorhynchus gigas of pigs, W. W. DIMOCK (*Sanidad y Benefic., Bol. Of. Sec. [Cuba], 2 (1909), No. 2, pp. 175, 176*).—The finding of this worm in the small intestine of pigs, on several occasions and in different localities, has led the author to believe that it is much more common in pigs in Cuba than is supposed and that it may be the cause of a series of symptoms common to Cuban pigs, to which a variety of names are given. The use of turpentine (in milk), calomel and santonin, creolin, naphthalin, male fern, etc., has, in many instances, resulted in marked improvement in the general condition of the animals treated.

Hereditary or transmissible diseases in horses, C. J. MARSHALL (*Amer. Vet. Rev., 35 (1909), No. 2, pp. 126–142*).—A paper read before the annual meeting of the Pennsylvania State Medical Association, March, 1909.

Cryptogamic poisoning in horses, R. N. MCCARROLL and R. H. MCMULLEN (*Amer. Vet. Rev., 35 (1909), No. 2, pp. 157–159*).—This article deals with the poisoning of horses which followed the ingestion of moldy beet tops, and which occurred during a period following alternately freezing and very mild weather.

Investigations of the enzootic cerebro-spinal meningitis of the horse, J. MARCQ (*Ann. Méd. Vét., 58 (1909), No. 1, pp. 11–24; abs. in Amer. Vet. Rev., 35 (1909), No. 4, p. 463*).—This disease, known in Belgium as Aizeau's disease, is thought by some to be a specific microbian disease, by others to be an intoxication from a substance existing in fodders. The affection has been observed in England, Austria, Germany, and America. The author has studied the disease in several horses and from cultures of the cerebral substance of one he succeeded in isolating a microbe. The mortality may reach 70 or 80 per cent. The results of medicinal treatment are doubtful.

The immunity of horses against horse sickness, A. THEILER (*Transvaal Agr. Jour., 7 (1909), No. 27, pp. 355–377*).—"The experiments show that the immunity obtained by one virus is by no means absolute, inasmuch as breakdowns do occur. These breakdowns must be considered to be due to the injection with a different strain which is of another nature. The experiments, however, with the Tzaneen strain clearly indicate that the virulency of a strain varies as it passes through the different generations, and it is probable that in practice a similar proceeding takes place, which at the present time we have not been able to follow up. The experiments have to be tested further with the other strains before we can definitely state that such an occurrence takes place with them. The experiments further prove that the immunity can be increased by mixing various strains together and creating a polyvalent strain, and it is clear from the tabulated analysis that the more injections an animal receives, either with a monovalent or with a polyvalent strain, the better the immunity.

"So far, in experimenting with a number of horses, we have not been able to produce such an immunity that it can in no way, and under no conditions, be broken, and it has, therefore, to be expected that, notwithstanding the number of times an animal has been injected with many different vira of monovalent and polyvalent character, a certain percentage of breakdowns will occur. The experience in practice so far shows that these breakdowns have in one year amounted to 13 per cent, and it is at this figure that I am inclined to place

the mortality of immunized horses, even when immunized with several monovalent or polyvalent strains. It stands to reason that when we increase the number of injections and increase the polyvalency of a virus the less the subsequent relapses will follow, but I am not prepared to say that by injecting horses several times, and thereby reducing the mortality from relapses, a complete immunity will be obtained sufficient to protect all injected animals. It is a noteworthy feature in the immunization and in the test of horses that relapses with dik-kop may occur more than once. In our experiments of 300 horses injected and tested, 194 showed dik-kop once, 46 dik-kop twice, and 1 animal a third dik-kop (15 per cent horses showing 2 dik-kops), and these dik-kops have sometimes been noted within 3 weeks of each other."

Some observations upon sidebone, ZIMMERMAN (*Abs. in Vet. Rec., 22* (*1909*), *No. 1113, p. 308*).—The author reports upon examinations made of 1,000 horses, with a view to estimating the frequence of ossification of the lateral cartilages.

Of the 62 heavy horses examined, 44 or 70.9 per cent were affected with ossification, of the 900 lighter van or coach horses, 279 or 31 per cent, and of the remaining 38, which were saddle horses, 10 or 26.2 per cent. All but 21 of the horses examined were over 5 years of age, but in none of the younger ones with 1 exception could alterations indicating ossification be demonstrated. The investigation confirms the fact that the fore feet are more affected than the hind and the outer cartilage more often than the inner.

Government certification of stallions, S. S. CAMERON (*Jour. Dept. Agr. Victoria, 7* (*1909*), *No. 7, pp. 447–480, figs. 12*).—This is the second annual report on the veterinary examination of stallions for the government certification of soundness and approval.

Infectious diseases following bench shows, J. M. PHILLIPS and L. P. GARRAHAN (*Amer. Vet. Rev., 35* (*1909*), *No. 3, pp. 280–285*).—In the disease of dogs commonly known as canine distemper, the author recognizes 2 forms, namely true distemper and dog plague. The plague is thought to occur less frequently than distemper, and its mortality is estimated at 30 per cent of all cases. An attack apparently confers complete immunity to plague but not to distemper, and a severe attack of distemper does not seem to confer any immunity to plague.

Echinorhynchus canis, B. F. KAUPP (*Amer. Vet. Rev., 35* (*1909*), *No. 2, pp. 154, 155, figs. 3*).—Four specimens of a parasite taken from the intestines of a dog are described as representing a new species (*E. canis*).

The presence of a leucocytozoon in dogs in Tonkin, C. MATHIS and M. LÉGER (*Compt. Rend. Soc. Biol.* [*Paris*], *67* (*1909*), *No. 25, pp. 98–100*).—During the course of their investigations of canine piroplasmosis in Tonkin, the authors have found a parasite in the leucocytes of a young dog that is apparently identical with the one discovered by Bentley in India in 1905 and since studied by several other workers. Only the mononuclear leucocytes were invaded by this parasite.

Tumors in the common fowl, E. E. TYZZER and T. ORDWAY (*Jour. Med. Research, 21* (*1909*), *No. 3, pp. 459–477, pls. 4*).—Tumors are apparently of frequent occurrence in the common fowl. Apart from certain specific peculiarities these are in every way analogous to the tumors of human beings. In addition to the tumors hitherto found in the hen, myxosarcoma and leiomyoma are described in the present series of cases.

A Microfilaria of the fowl, C. MATHIS and M. LÉGER (*Compt. Rend. Soc. Biol.* [*Paris*], *67* (*1909*), *No. 29, pp. 407–409, fig. 1*).—Under the name *Microfilaria seguini* the authors describe a new parasite which occurs in fowls in Tonkin associated with *Filaria mansoni*.

A trypanosome of the fowl, C. Mathis and M. Léger (*Compt. Rend. Soc. Biol. [Paris], 67 (1909), No. 30, pp. 452–454, fig. 1*).—The authors here describe a trypanosome which they found during the course of investigations of the parasites of the blood of the domestic fowl in Tonkin, to which they give the name *Trypanosoma calmettei.* The parasite is rarely found and does not appear to be pathogenic.

Studies on the spirochetosis of fowls caused by Spirochæta gallinarum, L. Blaizot (*Compt. Rend. Soc. Biol. [Paris], 67 (1909), Nos. 29, pp. 421–423; 30, pp. 447–449*).—The author finds that when the disease is transmitted by ticks (*Argas persicus*), the chickens almost always die before or on the day the spirochetes appear in the blood. In direct passage, by the injection of blood, the virulence of the spirochetes constantly increases as the transmission from fowl to fowl is continued.

The occurrence of spirochetosis of fowls in Somaliland, E. Brumpt (*Compt. Rend. Soc. Biol. [Paris], 67 (1909), No. 26, pp. 174–176*).—Spirochetosis produced in fowls through the application of ticks (*Argas persicus*) received from Dirrédaoua, Somaliland, was found to be due to *Spirochæta gallinarum.* This tick is said to have been the source of a considerable loss of poultry at Dirrédaoua. The author recognizes 4 species that are the cause of spirochetosis of fowls, namely, *S. anserina* in Caucasia; *S. gallinarum* in Brazil, South Oran, and Somaliland; *S. neveuxi* in St. Louis, Senegal; and *S. nicollei* in the oasis of Degache, Tunis.

The ectoparasites of the red grouse, A. E. Shipley (*Proc. Zool. Soc. London, 1909, II, pp. 309–334, pls. 13*).—Noted from another source (E. S. R., 21, p. 183).

The tapeworms of the red grouse, A. E. Shipley and W. Bygrave (*Proc. Zool. Soc. London, 1909, II, pp. 351–363, pls. 5*).—The 3 species of tapeworm which live in the alimentary canal of the grouse are *Davainea urogalli*, *D. cesticillus*, and *Hymenolepsis microps.* Examinations made of certain insects and arachnids for the cysts of these 3 species have been without results.

The threadworms of the red grouse, A. E. Shipley (*Proc. Zool. Soc. London, 1909, II, pp. 335–350, pls. 8*).—*Trichostrongylus pergracilis*, the red or fork worm (*Syngamus trachealis*), *Trichosoma longicolle*, and *Heterakis papillosa* are the species here described as the source of disease in red grouse.

Internal parasites of birds allied to the grouse, A. E. Shipley (*Proc. Zool. Soc. London, 1909, II, pp. 363–368*).—This is an annotated list of the cestode, trematode, and nematode parasites of the grouse, the ptarmigan, the black cock, and the capercaillie.

[Notes on endoparasites], A. Henry (*Bul. Soc. Cent. Méd. Vét., 86 (1909), No. 14, pp. 297–299*).—The occurrence of a very large Cœnurus in a rabbit, a Cysticercus in a hare, and an intestinal obstruction in a dog, caused by *Tænia cœnurus*, is noted.

RURAL ENGINEERING.

Review of ten years of Irrigation Investigations, R. P. Teele (*U. S. Dept. Agr., Office Expt. Stas. Rpt. 1908, pp. 355–405*).—This is a summary of the work of the Irrigation Investigations of this Office during the ten years since the inauguration of that work by Congress. It contains tabular summaries of the investigations of the duty of water, losses in transmission, checking of seepage losses, lining of canals, losses by evaporation and percolation, pumping water for irrigation, windmills, the use of alcohol as a fuel for pumping water for irrigation, construction of earthen reservoirs for storing storm water in the semiarid region, irrigation of rice, and irrigation in the humid sections of the United States. These summaries contain little matter which has not been included in previous bulletins, but bring together results there published.

Organization, work, and publications of Irrigation Investigations (*U. S. Dept. Agr., Office Expt. Stas. Circ. 87, pp. 12*).—Data are given as to the personnel of, scope of the work under way by, and brief synopses of the publications relating to the Irrigation Investigations of this Office.

Organization, work, and publications of Drainage Investigations (*U. S. Dept. Agr., Office Expt. Stas. Circ. 88, pp. 6*).—Data similar to the above are given for the Drainage Investigations of this Office.

The alluvial lands of the lower Mississippi Valley and their drainage, A. E. Morgan (*U. S. Dept. Agr., Office Expt. Stas. Rpt. 1908, pp. 407–417, pls. 2, figs. 2*).—The author refers briefly to some of the classic instances of successful drainage of alluvial lands, discusses the extent, formation, and characteristics of the alluvial lands in the Mississippi Valley, and emphasizes particularly the need of comprehensive and carefully organized drainage projects for the reclamation of these areas.

"It is a conservative statement that the key to the drainage of the southern Mississippi Valley, both of the alluvial lands and of the coastal plain adjacent, is the proper planning and construction of the main drainage outlets. . . .

"In the States of the lower Mississippi Valley are 10,000,000 to 15,000,000 acres of land awaiting drainage. The investigations of recent years have established the feasibility of this work, the state legislatures are providing for the necessary legal procedure, and a great public interest is awakened in the prospect for reclamation. The outlook is that during the next few years a vast area of exceedingly fertile land will be added to our agricultural domain, that malaria in the alluvial region will pass away, as it has passed in some of the more northern States, where it was once prevalent, and that a prosperous rural people will occupy the entire alluvial lands of the lower Mississippi Valley."

A preliminary report on the St. Francis Valley drainage project in northeastern Arkansas, A. E. Morgan (*U. S. Dept. Agr., Office Expt. Stas. Circ. 86, pp. 31, fig. 1, maps 2*).—This is a brief statement and discussion of a comprehensive plan for the reclamation of nearly 1,000,000 acres of wet and overflowed lands of the St. Francis Basin in northeastern Arkansas. The proposed plan provides for the disposition of run-off waters from 4,000 square miles of land in Missouri, and 1,500 square miles in Arkansas; also for a detail system of complete drainage, and for the possible requirements of navigation.

The feature of the plan is the proposed system of wide floodways lined by dikes or levees, to carry the excessive volumes of flood waters from Missouri through the district, in place of the customary plan of improving the present natural channels. It is estimated that the cost of construction of an adequate system of floodways carrying storm run-off above ground level would not be more than 10 per cent of the cost of improving the natural channels sufficiently to accomplish the same purpose. The report concludes with an estimate of the cost of the proposed reclamation, amounting to nearly $7,000,000, or about $8 per acre.

Farm drainage, C. P. Norgord (*Arkansas Sta. Bul. 104, pp. 287–314, figs. 17*).—This bulletin discusses the benefits and methods of farm drainage in Arkansas, describing both the tile and open ditch systems, and giving tables for the selection of the proper sizes of tile, spacing, and depth to be used. Brief popular descriptions are given of the various systems of tile draining, with instructions on the use of leveling instruments, determining proper grades, digging the ditches, laying the tiles, and refilling.

By way of illustration, data are given as to the cost of reclaiming and thoroughly tile draining about 20 acres of swampy land rented by the station. The cost averaged $19.53 per acre.

Cement and concrete fence posts, H. M. Bainer and H. B. Bonebright (*Colorado Sta. Bul. 148, pp. 3–36, figs. 10*).—As a result of the increasing scarcity and cost of wood and the prohibitive cost of iron fence posts, cement and concrete posts are beginning to be used as substitutes. Though these are somewhat expensive at present, they are long-lived, present a good appearance, and can be made on the farm.

Part 1 of this bulletin discusses the materials suitable for their construction, gives directions as to proportions for use, the mixing of materials, and the making, reinforcing, curing, and handling of both poured and tamped posts, describes a homemade concrete mixer designed by the station, and several forms of post molds and wire fasteners, and gives other useful data. Part 2 reports experiments conducted for the purpose of determining the method of building the best posts at the least cost. In these experiments a total of 238 line posts and 8 corner posts, variously constructed and reinforced, were tested as to breaking strain under conditions as nearly like those of fencing as possible. The results are reported in tabular form, and the following conclusions are drawn:

"Poured posts are easier to make than tamped ones. They are somewhat more expensive because one mold will make but one poured post per day, while the same mold may be used for making as many tamped posts as the builder can mix and tamp in the same time.

"According to the tests made poured posts are a little over 25 per cent stronger than tamped ones of the same size, mixture and reinforcement.

"Poured posts are not so porous as the tamped ones and are therefore more nearly waterproof, thus making them better able to withstand the action of frost and alkali.

"The poured post is enough better in every respect to justify its construction and use in preference to the tamped one.

"Most commercial molds make a post which tapers from the base to the top, but the most economical mold is one which casts a post as large at the ground line as at the base, tapering from the ground line to the top. . . .

"The best form of post is one which is equally strong from all directions. The square, or round post, fulfills this requirement. The triangular post does not meet the requirements because it can not be economically constructed so as to be equally strong from all directions.

"To be economical, the amount of reinforcement should be in proportion to the size of the post and strength of the mixture. . . .

"The material used for reinforcement should be strong, light and rough enough to permit the mixture to get a firm grip upon it. It should be very rigid, with little or no tendency to spring or stretch.

"The smooth reinforcement tends to slip even if hooked at the ends.

"Two or more wires twisted together make as satisfactory a reinforcement as can be obtained.

"Crimped wire tends to straighten and thereby breaks pieces out of the post at the point of greatest stress.

"The reinforcement should be placed in each corner of the post at a depth of from $\frac{5}{8}$ to $\frac{3}{4}$ in. from the surface. . . .

"The posts should be cured in the shade for at least 60 days, the first 30 days of which they should be sprinkled daily."

Silo construction, L. Carrier (*Virginia Sta. Bul. 182, pp. 3–23, figs. 13*).—This bulletin describes materials, methods and costs of constructing types of silos which have proved satisfactory and which it is believed will be used in the future.

One of the types described is a round silo with wooden hoops which stands in the corner of a basement barn and is 8 ft. 4 in. in diameter and 30 ft. high. The first 9 ft. is of brick, and the upper 30 ft. was constructed of 1 by 2½-in. matched Norway pine flooring, held in place by 16 wooden hoops. The hoops can be made of any wood that is tough and flexible enough to bend to the required circle, but green elm is recommended for the purpose. The strips should be ½ in. in thickness and 4 in. wide. A special frame for building these wooden hoops is described.

In the erection of a concrete block silo the expense can be reduced by using a homemade form for making the blocks. Both wooden and sheet iron forms for building a solid concrete wall are considered in detail. The injurious action of silage acids on the cement wall can be prevented by giving the inside wall a thin coating of cement every year or two, which can be done at filling time with very little trouble. A solid brick wall silo is expensive but the cost can be materially reduced by using the double wall method reenforced by metal.

Details are given for constructing foundations, doors, and roofs. Emphasis is laid on the necessity of reenforcing the concrete and brick silos. The inner surface of the superstructure should be placed flush with the inner edge of the foundation to prevent rotting of the silo at the joints. The cost of the roof ranges from $25 to $50, but it is usually desirable in order to lessen the probability of freezing and also to keep out excessive rainfall. It is thought unwise to build silos much larger than 22 ft. in diameter. A silo of only 8 or 10 ft. in diameter should not be over 28 or 30 ft. in height.

A list of publications on silos and silage published by this Department is given.

Combination laundry and dairy house, J. E. Bridgman (*Texas Farm and Ranch, 28 (1909), No. 45, p. 15, fig. 1, dgm. 1*).—Plans are given and described for a combination farm dairy and laundry.

RURAL ECONOMICS.

The relation of the farmer to the present high prices of cereals and bread, R. J. Oswald (*Wiener Landw. Ztg., 59 (1909), No. 66, pp. 651, 652*).—This article gives statistics of the highest and lowest prices of wheat, rye, barley, oats, and corn in Austria during each of the years 1869–1909, inclusive, and discusses their bearing on the prices of bread.

The farmer is shown to derive no benefit from the high prices of bread and other products made from cereals, as, if any great profit is secured, it goes to the middleman. The complexity of the social organization by means of which the raw materials are passed through many hands before reaching the consumer in the form of food supplies is held to be the cause of the high prices of bread and other necessities to the consumer. To meet this difficulty, the organization of cooperative mills and bakeries to bring producer and consumer together is advocated, statistics being quoted to show that such cooperative societies have been operated in cities with large profits.

What we must do to be fed, J. J. Hill (*World's Work, 19 (1909), No. 1, pp. 12226–12254, figs. 22*).—This is a popular article dealing with the problem of our increasing population and lack of proportionate increase in our wheat production.

Among the remedies suggested are the establishment of a land system that shall encourage bona fide settlers; the establishment of government model farms; more intensive culture of farms; and the improvement of farm methods, which means that a farmer must cultivate no more land than he can till thoroughly, and that there must be a rotation of crops, and soil renovation by

fertilization. In these ways, the author believes that the average wheat production in the United States can be raised from 14 to 28 bushels per acre. This will enable our country to provide bread for a population of 200,000,000.

Railroads and agriculture, M. V. Richards (*1909, pp. 4*).—This is an address delivered before the Farmers' National Congress, held at Raleigh, N. C., November 4–9, 1909.

The article discusses the field in the United States for agricultural expansion, the extent of agricultural freight traffic handled by railroads in 1908, the forms of active assistance given by railroads to agriculture including the special educational trains furnished the instructors in agricultural colleges and experiment stations or to state officials for carrying instruction to farmers, and the relation of the railroads to the settlement of farm lands. "They have used nearly every method at their command to aid in the work of making farming profitable, of increasing the productiveness of the lands, and of advancing agricultural conditions."

Practical farm economics, L. Ogilvy (*Breeder's Gaz., 56 (1909), No. 15, p. 686*).—The author advocates in meetings of farmers during the winter months the discussion of questions relating to farm economics as a result of their own experience. It is believed that much practical information regarding farm management, the amount of capital to invest in machinery, the keeping of live stock to the greatest advantage, and the farm labor problem could be derived from such meetings and be used to good advantage in rural economy.

The legal status of farm crops, H. L. Snyder (*Ohio Farmer, 124 (1909), No. 18, p. 353*).—The manner of regarding crops by the courts as real or personal property in different States under land ownership and tenant lease is pointed out in this article.

Agricultural statistics.—Chattel mortgages, J. S. Duff (*Ann. Rpt. Bur. Indus. Ontario, 1908, pp. 47*).—Statistics on the acreage, production, and market value of the field crops and fruits; the classes, number, and value of the live stock; farm labor and wages; the value of farm properties and implements; farm values and rentals per acre; and the value of chattel mortgages both against all occupations and against farmers on record and undischarged in the Province of Ontario, on December 31, 1908, are tabulated and discussed.

Harvest wages ranged from $1 to $2 a day with board, while monthly rates varied from $15 to $35 with board, according to experience. "The quality of most of the labor offering was not up to the standard, but capable men were yet much in demand. Many farmers are now depending upon improved machinery and an interchange of work with their neighbors to meet the labor situation. The problem of getting adequate female help in the farm household is as yet unsolved, domestic servants being scarcer than ever." Wages were a little lower in 1908 than in 1906 except for domestic servants.

The number of farm mortgages was 7,098 amounting to $2,768,786 as compared with 6,438 amounting to $2,442,589 in 1907.

[Agricultural laborers in the United Kingdom], G. R. Askwith (*Bd. Trade [Gt. Brit.], Rpt. Changes in Rates of Wages and Hours of Labor, 16 (1908), pp. 31–34, 171–174*).—Statistical data of the changes in rates of wages, hours of labor, and the number of agricultural laborers of all classes employed in 1908, as compared with similar data for the years 1899–1907, inclusive, are tabulated and discussed.

In England and Wales "the estimated number of agricultural laborers in districts where wages were reported to have changed in 1908 was 53,914, while the number in districts where wages were reported as unaltered was 320,289. Wages were raised in districts containing 40,134 laborers, and reduced in districts containing 13,780 laborers. The estimated net increase in 1908, in the

wages of those affected, in the districts in which changes were reported, amounted to £727 per week as compared with an increase of £376 in 1907." In Scotland there was little or no change in wages at the spring and summer hirings, but during the latter part of the year wages showed a downward tendency. On the returns in Ireland 71 per cent showed no change in wages, while the remainder disclosed an upward tendency in the rates of wages due to an increasing scarcity of labor caused partly by emigration.

The German agricultural labor problem according to the latest investigations, W. ROHRBECK (*Ztschr. Agrarpolitik, 7 (1909), Nos. 6, pp. 311–324; 9, pp. 485–496*).—These articles summarize the results of economic and social studies published during the years 1902 to 1909, inclusive, discussing the labor, wages, housing, and settlement of farm laborers.

An extensive bibliography relating to the agrarian problem in Germany is included.

The care of sick and injured persons employed in agriculture and forestry, SCHUMACHER (*Deut. Landw. Presse, 36 (1909), Nos. 76, pp. 805, 806; 77, pp. 814, 815*).—These articles set forth the provisions made by the State and mutual societies in Germany for the attendance of physician, medicine, and financial assistance rendered to those taken sick or injured while employed in rural pursuits, whether in the field or as domestic servants.

Experiments of the Prussian forest commission in the settlement of forest workers, RÖHRIG (*Ztschr. Forst u. Jagdw., 41 (1909), No. 10, pp. 629–660*).—The advantages of a system of forest settlements devised and carried out by the state forest control in Prussia are described in this article.

The plan consists in general in the establishment of forest employees in settlements rather than in isolated homesteads, the providing of good dwellings and land for cultivation, the granting of certain firewood and other privileges, etc. The advantages consist in enabling the children to attend school, in avoiding the ordinary isolation of a forester's life for self and family, the opportunity afforded the forester to employ his time to the best advantage, the encouragement of the young to engage in agricultural pursuits, and the checking of rural depopulation.

Producers' associations and cooperative selling and credit societies in France to January 1, 1909 (*Bul. Off. Travail [France], 16 (1909), Nos. 7, pp. 759–771; 8, pp. 858–864; 9, pp. 975–984; 10, pp. 1080–1085*).—Complete returns for the year 1908 are presented and discussed.

The producers' associations numbered 431, the selling associations 2,491, and the cooperative credit societies or banks 2,636, there being material increases over the year 1907 (E. S. R., 20, p. 888). The district mutual credit banks increased from 88 in 1907 to 94 in 1908.

[Mutual agricultural credit banks in France in 1908], J. RUAU (*Bul. Mens. Off. Renseig. Agr. [Paris], 8 (1909), No. 9, pp. 1211–1231; Écon. Franç., 37 (1909), II, No. 37, pp. 390–392*).—This is a report by the minister of agriculture on the work of these societies during 1908.

The number of local banks increased from 2,168 to 2,636, the number of members from 96,192 to 116,866, and the loans made to 40,129,192 francs, of which 29,720,297 francs were outstanding at the close of the year. The rates of interest ranged from 3 to 5 per cent, the general average for the year being from 3½ to 4 per cent.

Cooperative credit in Bengal (*Indian Agr., 34 (1909), No. 9, pp. 266, 267*).—The progress of cooperative credit societies for the 9 months ended March 31, 1909, is reported. There were 359 rural societies, an increase of 33 during the period. Of the purposes to which loans from societies were applied, repayment

of debts accounts for 37 per cent of the total and cultivation of land and the purchase of cattle for 36 per cent.

Rural New England, CHARLOTTE R. F. LADD (*Trans. Mass. Hort. Soc., 1909, pt. 1, pp. 119–129*).—This paper points out some means for the improvement of rural conditions in New England, such as improving soil fertility, intensive agriculture, road improvement, better rural schools, and state aid in encouraging agriculture.

Competitions for the Léon Faucher prize in 1908, E. LEVASSEUR (*Concours pour le Prix Léon Faucher 1908. Paris, 1908, pp. 168*).—This is a summary of the essays which received prizes in this competition in 1908. The topics discussed relate to the agricultural development of 17 provinces in France, as to changes which have taken place during the past half century in the methods of culture, products, markets, prices, and conditions of the landowners and laborers.

Rural settlement and agriculture (*Off. Yearbook N. S. Wales, 1907–8, pp. 263–276, 347–408*).—Statistics on the number, size, and character of land holdings in New South Wales in 1908 are tabulated and discussed.

The number of holdings above 1 acre in extent was 81,732 comprising 49,901,837 acres, or an average size of 611 acres per holding. Of these holdings 23,591 were under 16 acres, 30,908 from 16 to 200 acres, and 10,451 from 201 to 400 acres in extent. Of the total acreage only 2,362,590 acres are cultivated.

Statistics are also given on the nature, yields, and value of crops, the number, classes, and value of the live stock, and on the kinds and value of dairy products.

Crop Reporter (*U. S. Dept. Agr., Bur. Statis. Crop Reporter, 11 (1909), No. 11, pp. 73–80*).—Statistics on the condition, value, and prices of the principal crops in the United States, notes on foreign crop conditions, and articles on statistics of mortality among farmers, per capita production of farm products, and wheat prices in England in six centuries are reported.

Imports of grain in the cereal year 1908–9 (*Jour. Bd. Agr.* [*London*], *16* (*1909*), *No. 6, pp. 470–474*).—The production of grain crops in Great Britain, the average prices for the year, and the imports of cereals, including the countries from which they were consigned, are tabulated and discussed in this article. Comparative data are also given of the imports of wheat, wheat flour, barley, oats, and corn, from 1897–8 to 1908–9.

"It will be seen that, except in the case of wheat, practically no expansion in the supply has taken place during the past few years, the imports being either more or less stationary, or, as in the case of flour, maize, and oats, actually less than in earlier years."

International Institute of Agriculture at Rome, D. LUBIN (*Cal. Cult., 33* (*1909*), *No. 14, pp. 315, 324*).—This article describes the functions and work of the institute.

AGRICULTURAL EDUCATION.

Progress in agricultural education, 1908, D. J. CROSBY (*U. S. Dept. Agr., Office Expt. Stas. Rpt. 1908, pp. 231–288, pls. 5*).—A brief summary of progress in agricultural education during the 11 years from 1897 to 1908, inclusive, is followed by a review of the principal developments in agricultural education during the last half of the fiscal year 1908, including the educational work of this Department, the principal developments in agricultural education in foreign countries, the work of the National Education Association, and the leading items of interest concerning the colleges of agriculture in the United States, and

secondary and elementary schools in which agriculture is taught. The data concerning the secondary schools includes recent legislation in some of the States and outlines of several high-school courses of study.

Statistics of land-grant colleges and agricultural experiment stations, 1908, MARIE T. SPETHMANN (*U. S. Dept. Agr., Office Expt. Stas. Rpt. 1908, pp. 191–230*).—A compilation from official sources of general statistics, courses of study, attendance, value of funds and equipment, revenues, and additions to equipment of the land-grant colleges, and of the lines of work, revenues, and additions to equipment of the agricultural experiment stations in the United States for the fiscal year ended June 30, 1908.

The farmers' institutes in the United States, 1908, J. HAMILTON (*U. S. Dept. Agr., Office Expt. Stas. Rpt. 1908, pp. 289–335*).—This is the annual report of the Farmers' Institute Specialist of this Office concerning the work of the Office in promoting farmers' institutes and the development of the farmers' institute movement in the different States and Territories. Data are also included concerning college extension work, movable schools of agriculture, a winter agricultural school, farm clubs, demonstration fields, and other educational activities closely related to farmers' institute work.

The agricultural and industrial educational movement in the South, G. B. COOK (*Proc. Conf. Ed. South, 12 (1909), pp. 69–84*).—A brief survey of some of the features of general industrial advancement in the South is followed by some general considerations concerning the progress in agricultural education and more particularly by references to recent features of progress in the Southern States.

Education and economic development, A. C. ELLIS (*Proc. Conf. Ed. South, 12 (1909), pp. 171–186*).—In this address the author gives numerous illustrations of the economic development resulting largely from the instruction given in the agricultural and mechanical colleges, such for example as recent developments in selecting and growing corn, the successful combating of ravages of the white scale in California, and the fight against the cotton boll weevil and the Texas fever tick. He also refers to other economic developments in the fields of mining, medicine, and economics.

School of Domestic Economy and Education of the Province of Bergamo, S. BALP (*Bol. Min. Agr., Indus. e Com. [Rome], 8 (1909), Ser. C, No. 7, pp. 13–38*).—A report, made at the inauguration of the school on August 2, 1909, at Parma, on the origin, development, regulations, and scope of the school, including the course of study. The instruction includes (1) moral education, (2) elements of science, and (3) practical instruction in all matters relating to the home.

Corn Day annual for the public schools of Illinois, F. G. BLAIR (*Dept. Pub. Instr. [Ill.], Circ. 38, pp. 43, figs. 20*).—This circular is intended to awaken and direct still further the interest of Illinois school boys and girls in the study and growing of corn, with special reference to the observance of "Corn Day." It includes a careful study of the ear, kernel, growing plant, soil, water, and tillage conditions necessary to its success, and the diseases and insects which attack it. Osmosis, capillarity, transpiration, soil temperature, fertilizers, crop rotation, corn products and their food values, and seed testing are some of the additional topics incidentally considered.

What one class in agronomy did, W. N. CLUTE (*School Sci. and Math., 9 (1909), pp. 731–735*).—An account is given of one season's work in class room and gardens at the Joliet (Ill.) Township High School.

The fly-aways and other seed travelers, F. M. FULTZ (*Bloomington, Ill., 1909, pp. 186, figs. 94*).—This is a nature study book for children. The story of seed dispersal is truthfully told but in language simple enough for the five-

year-old child to understand. Illustrations are given of the dispersal of seeds by wind, water, birds, and animals, and by the voluntary action of man.

Forestry in nature study (*U. S. Dept. Agr., Office Expt. Stas. Spec. Circ., pp. 10*).—This circular, prepared by the Forest Service of this Department for special distribution among teachers attending the Alaska-Yukon-Pacific Exposition, presents an outline of a tentative course in elementary forestry for the first eight grades of the common schools. There is also an appendix containing a list of appropriate bulletins and circulars issued by this Department, and also a list of 29 other publications.

Farm forestry, A. AKERMAN (*Athens, Ga.: Ga. Forest Assoc., 1909, pp. 22*).—This is a preliminary outline of what is to be developed into a text-book of forestry for use in the schools of Georgia. It contains brief descriptions of the trees of the State, suggestions for propagation and planting, protection from forest fires, and the harvesting and disposal of forest products.

Dumb animals and how to treat them, E. K. WHITEHEAD (*Denver, 1909, pp. XX+128, figs. 45*).—This book is designed to give some definite teaching to children concerning their duties toward domestic and other animals, and seeks to supply effective motives for treating animals with justice and kindness. The following topics selected from its table of contents illustrate its agricultural bearing: Profit in kindness to domestic animals; feeding, watering, sheltering, and exercising animals; proper harnessing and care of horses; shoeing, driving, and training horses; treatment of balking; cows and other cattle; sheep and hogs; chickens, ducks, geese, and other fowls; wild birds and animals; insects and reptiles; and our ignorance concerning animals.

MISCELLANEOUS.

Annual Report of the Office of Experiment Stations, 1908 (*U. S. Dept. Agr., Office Expt. Stas. Rpt. 1908, pp. 417, pls. 14, figs. 4*).—This includes the usual report on the work of this Office for the fiscal year ended June 30, 1908, and of the work and expenditures of the agricultural experiment stations in the United States, including those of Alaska, Hawaii, and Porto Rico, an account of agricultural conditions in the Island of Guam, statistics of the land-grant colleges and experiment stations for 1908, and several articles and reviews abstracted elsewhere in this issue.

Annual Report of New Jersey Stations, 1908 (*New Jersey Stas. Rpt. 1908, pp. 428*).—This contains the organization list of the stations, a financial statement for the State Station for the fiscal year ended Ocober 31, 1908, and for the College Station for the fiscal year ended June 30, 1908, and a brief report by the director, together with departmental reports which are abstracted elsewhere in this issue. A report on the inspection of feeding stuffs has been previously noted (E. S. R., 20, p. 69), as has also one on the inspection of Paris green and lead arsenate (E. S. R., 20, p. 656).

Experiment Station Work, LIII (*U. S. Dept. Agr., Farmers' Bul. 374, pp. 32, figs. 5*).—This number contains articles on the following subjects: Inoculation and lime for alfalfa, citrus culture in southern Texas, pruning rotundifolia grapes, nutritive value of native hays in the arid region, Bermuda grass, short *v.* long feeding of beef cattle, contagious abortion of cattle, preventing losses at lambing time, winter lambs for the Pacific coast market, feeding work horses, colony houses for poultry, food of the crow blackbird, and flour for baking powder biscuits.

Accessions to the Department Library, July-September, 1909 (*U. S. Dept. Agr., Library Bul. 73, pp. 63*).

NOTES.

Arkansas University.—Dean Adams recently accompanied the members of the boards of trustees of the four secondary schools of the State on a visit of inspection to the agricultural schools of Alabama, Georgia, and Mississippi. Following the trip an agreement as to the respective functions of the collegiate and secondary agricultural institutions was formulated.

R. J. Nelson, head of the department of agricultural education, resigned January 1 to accept the editorship of *Farm and Ranch*, and has been succeeded by adjunct professor J. W. Wilson. The department of farmers' institutes is undertaking the development of a state and county fair system, and is also endeavoring to stimulate public interest in the reclamation of swamp lands.

Connecticut State Station.—The research laboratory was destroyed by fire on the early morning of January 10, nothing being left but a portion of the walls. The cause of the fire is unknown. The building and contents were well insured, but there will still be a large loss, especially in the chemical department, the most serious item being the very valuable chemical library, and animals which had been under experiment for five months. The forester's office and the office and laboratory of the plant breeder were also located in the building. The more valuable records were in a fire-proof vault, which was uninjured.

Georgia College.—Itinerant schools are being organized by the extension department, and it is expected to hold at least 11 within the next 3 months. The attendance upon the cotton school and other short courses offered this winter has been very gratifying. Tests have been made with a new style of gin and with a cotton picker. The gin gives promise of so delinting cotton as to cause less injury to the fiber than the methods now in use.

Some interesting studies concerning the breeding of cotton and corn are being prepared for publication. These tests were conducted in the demonstration field, which is maintained by the college as a part of its laboratory system for students, but which at the same time enables the prosecution of research work.

Idaho University.—It is planned to hold an annual recognition day, the purpose of which will be to give official recognition to men who have been prominent in the development of the State and the promotion of its interests. It is expected that the list will include many who have promoted the development of irrigation, live stock, fruit growing, and other agricultural enterprises, and also many prominent in educational circles. The ceremony will take place each year as a part of the commencement exercises.

Illinois University.—A Farmers' Hall of Fame has been established in the college of agriculture "to record the services and commemorate the lives of the great leaders of the State in the development of agriculture from a pioneer art to a civilized science on which the prosperity of all classes will ultimately depend." The selection of names rests with a commission, which thus far has chosen 4 men: Cyrus Hall McCormick, inventor of the reaper; James N. Brown, first president of the state board of agriculture; Isaac Funk, a successful and influential pioneer farmer; and Prof. Jonathan B. Turner, an early advocate of the land-grant plan for the support of industrial education. Exercises were

held December 15 installing the name of Mr. McCormick in the Hall of Fame. The ceremonies included the unveiling of a portrait, and addresses by Governor Deneen, President Grout of the commission, Dean Davenport, and others.

Louisiana Stations.—Dr. P. A. Yoder has resigned as research chemist at the Sugar Station.

Massachusetts College and Station.—S. C. Damon, of the Rhode Island Station, has been succeeded on the board of trustees by H. L. Frost, of Arlington, who has also been chosen to the committee on the station. W. H. Bowker has been succeeded on this committee by Charles H. Ward.

E. K. Eyerly, Ph. D., has been appointed assistant professor of political science and lecturer in rural sociology, vice George N. Holcomb, who is to continue as lecturer in political science. Fred W. Morse, formerly of the New Hampshire College and Station, has been appointed research chemist in the station and entered upon his duties January 18. For the present his work will be chiefly connected with the asparagus investigations.

Missouri University.—The new agricultural hall was dedicated December 28, addresses being made by Governor Herbert S. Hadley, President A. Ross Hill, of the university, Dean Mumford, and representatives of various state boards and societies. The exercises were followed in the evening by the sixth annual banquet to the farmers of the State, this completing the programme for the annual Farmers' Week.

The Wabash Railroad has offered to each of the 18 counties in the State through which its lines run a scholarship of $50 in the short winter courses.

Nebraska University.—Claude K. Shedd has been appointed instructor in farm mechanics.

Nevada Station.—Charles S. Knight, assistant in agronomy at the Kansas College, has been appointed assistant professor of agronomy, and has entered upon his duties.

North Dakota College and Station.—Fire of unknown origin destroyed the chemical laboratory building on the evening of December 24, causing a loss on building and equipment estimated at $63,000.

Cornell University and Station.—A fruit special was sent out December 6 on a trip of nearly 600 miles, during which it made 76 stops and was visited by about 15,000 people, many of them school children and city residents. The illustrative material was made up largely of an extensive exhibit of New York apples packed in California standard boxes, a collection of 150 varieties of apples from all over the United States, and an exhibit of the more prevalent plant and insect pests.

The third annual Farmers' Week was held at the college February 7–12. Among the special features this year were a state potato show, judging demonstrations of live stock, fruit, and other farm produce, a boys' and girls' corn congress, potato and alfalfa schools, meetings of the drainage and plant breeders' associations and the experimenters' league, a poultry institute and exhibit, and a housekeepers' conference.

A second industrial fellowship has been established in the department of plant pathology, to which V. B. Stewart, a 1909 graduate of Wabash College, has been appointed. This fellowship is limited to two years, and has for its purpose the investigation of the diseases of nursery stock, especially fire blight.

Ohio University and Station.—The college, the station, and the state board of agriculture operated an educational train in southeastern and southern Ohio during the last two weeks in January, covering a distance of about 500 miles. Lectures were given in fruit growing, dairying, and forestry.

Pennsylvania Institute of Animal Nutrition.—Homer Cloukey and Hiram A. Dodge, 1909 graduates, respectively, of the Oklahoma College and the Uni-

versity of Vermont, have been appointed assistants, vice John W. Calvin, resigned to accept a position as assistant chemist at the Kansas Station, and Roy C. Jones, resigned to become instructor in dairying at the Montana College.

Rhode Island College.—A Farmers' Week devoted to work in agronomy and dairying, was held this winter for the first time, beginning December 27, with a good attendance and much interest.

Texas Station.—Raymond H. Pond, Ph. D., recently connected with the Municipal Sewage Commission of New York, has been appointed plant pathologist in the station. Dr. O. M. Ball will hereafter confine himself to work in the college.

An Agricultural Short Course in a Missouri State Normal School.—*Colman's Rural World* for December 29, 1909, states that the normal school at Cape Girardeau, Mo., will offer a 6 weeks' course in agriculture for the benefit of those in the agricultural district surrounding this school who can not attend regular school work but desire some training in the business of farming.

Madras Agricultural College.—*The Tropical Agriculturist and Magazine of the Ceylon Agricultural Society* for October announces the completion and dedication of the agricultural college at Coimbatore, which was authorized by the government of India in 1905. A farm of 450 acres has been under cultivation during the past 2 years, and 20 students were admitted in June of this year. The course of training extends through 3 years and includes theoretical and practical instruction in general agriculture, entomology, agricultural engineering, veterinary science and kindred subjects, with special provision for research investigations. The present staff consists of an expert agriculturist, a botanist, and an agricultural chemist, and eventually will include an entomologist and mycologist.

Miscellaneous.—At the recent meeting at Boston of the American Association of Economic Entomologists, officers were elected for the current year as follows: President, E. Dwight Sanderson; first vice-president, H. T. Fernald; second vice-president, P. J. Parrott; and secretary-treasurer, A. F. Burgess. The next meeting is to be held in Minneapolis, December 28.

W. J. Colebatch, for several years on the staff of the Victorian Department of Agriculture, has been appointed to the position of superintendent and instructor in agriculture in South-East Australia and manager of the Kybybolite Experimental Farm in South Australia, and entered upon his new duties November 16. He will also be in charge of the Roseworthy Agricultural College during the absence of Professor Perkins this year.

A recent number of the *Wiener Landwirtschaftliche Zeitung* announces the retirement of Prof. Julius Kühn, at the age of 85 years, as director of the Agricultural Institute of Halle, and the appointment of Prof. F. Wohltmann as his successor. Professor Kühn will still continue some of his lecture work.

A recent number of the *Wiener Landwirtschaftliche Zeitung* announces the appointment of Dr. Otto Gratz as director of the Royal Hungarian Dairy Experiment Station at Magyar-Ovar (Ungarisch-Altenburg).

The *Deutsche Landwirtschaftliche Presse* of November 27, 1909, announces the appointment of E. Tietz, former assistant at the Berlin Royal Agricultural High School, as professor of agriculture and forestry at the German-Chinese High School opened October 28 at Tsingtau (Kiautschou), China.

A recent number of *La Tribune Horticole* announces the death of Clement Marchandise, inspector of horticulture in the Rural Office of the Belgian Ministry of Agriculture. He was professor of horticulture in the National School of Horticulture at Vilvorde, France, from 1864 to 1909.

EXPERIMENT STATION RECORD.

Editor: E. W. ALLEN, Ph. D., *Assistant Director.*
Assistant Editor: H. L. Knight.

EDITORIAL DEPARTMENTS.

Agricultural Chemistry and Agrotechny—L. W. Fetzer, Ph. D.
Meteorology, Soils, and Fertilizers—W. H. Beal.
Agricultural Botany and Vegetable Pathology—W. H. Evans, Ph. D.
Field Crops { J. I. Schulte. J. O. Rankin.
Horticulture and Forestry—E. J. Glasson.
Foods and Human Nutrition—C. F. Langworthy, Ph. D.
Zootechny, Dairying, and Dairy Farming—E. W. Morse.
Economic Zoology, Entomology, and Veterinary Medicine—W. A. Hooker.
Rural Engineering— ——— ———.
Rural Economics—J. B. Morman.
Agricultural Education—D. J. Crosby.

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AGRICULTURAL BOTANY.

FIELD CROPS.

HORTICULTURE.

FORESTRY.

DISEASES OF PLANTS.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

DAIRY FARMING—DAIRYING.

VETERINARY MEDICINE.

RURAL ENGINEERING.

RURAL ECONOMICS.

AGRICULTURAL EDUCATION.

MISCELLANEOUS.

LIST OF EXPERIMENT STATION AND DEPARTMENT PUBLICATIONS REVIEWED.

NOTE.—The publications of the United States Department of Agriculture may be purchased from the Superintendent of Documents, Washington, D. C., to whom all remittances should be made. The price of *Experiment Station Record* is $1 per volume, and there will be two volumes each year. The prices of other technical publications are given above. The publications of the State experiment stations are distributed from the stations and not from the Department.

EXPERIMENT STATION RECORD.

Vol. XXII. March, 1910. No. 3.

Popular interest in economic questions relating to the agricultural industry has recently assumed unusual prominence. Generally speaking, it concerns itself primarily with the food supply of the future in relation to our agriculture, and the present production and prices of agricultural products; but the broad consideration of these matters leads into the field of the present condition and trend of our agricultural system, and the relationship of the industry to other industries and to the welfare of the country as a whole.

While often approached from a superficial and local standpoint, both classes of questions turn upon economic conditions which reach deep into the systems developed in this country for producing, transporting, and distributing the products of the soil. Considering the vital importance of the subject this interest is timely, and it presents an opportunity which should not be lost sight of. The present situation strongly emphasizes the need and the utility of thoroughgoing economic studies in this field, and it likewise brings out the dearth of data at present available for an intelligent and effective consideration of the economics of the food supply of the people.

Gradually the underlying importance of agricultural production to human progress and welfare has impressed itself upon a few writers, who have set forth in no uncertain terms the trend of the present practice and its inadequacy to meet the needs of the near future. It has been shown that production of the staples in this country is not keeping pace with the increased home demand, and that without a change in the methods of farming and the establishment of a permanent, self-sustaining agriculture, such as has not yet been established in any country, the food supply of the future will not be adequate to meet the needs of the teeming millions.

Farming in the true sense, under systems which conserve the fertility instead of mining it, has been little practiced as yet, and the skimming process has been transferred from one section to another until the limit has been nearly reached. More conservative and thorough methods are already forced upon the farmers in some sections, involving more efficient but usually more expensive production. The

settling up of the new lands and the passing of the open range have brought about new economic conditions of production, which have been far-reaching in their influence.

Suddenly, almost, the people are made to feel the result of such changes in an increased price of staple products, and interest in the subject becomes widespread and intense. The attempts of the public to account for this advance are only partially effective. They are often one-sided, and lay undue emphasis on certain factors which are singled out. A true sense of proportion and a careful weighing of all the contributory influences are lacking, and this makes the generalizations subject to attack. While much light may be thrown on the subject by various forms of inquiries, such inquiries must inevitably lack in scientific qualities, because the data are not at hand for a thorough scientific study nor the means for acquiring that data.

Even among economists there is divergence of opinion as to the cause and the legitimacy of the recent advance in prices, and also as to what stage from the farmer to the consumer is chiefly responsible for the change, or profits unduly by it. In the absence of definite economic studies in this field, the discussion of the subject becomes to considerable extent a matter of speculation, and the public is without guidance. It sees the result and arrives at conclusions hastily. Broad deductions are made which are very largely based on general opinion, often colored by the personal point of view. Without the facts, responsibility for the cause can be shifted from one stage to another, to the added confusion of the consumer. He is misled by his own deductions and by misrepresentations, and is incited to unjust and ineffective action.

In the meantime the farmer, who must look ahead in his business and must always bear an undue share of the risk of production and distribution, stands in great danger of suffering most from such an agitation. Whatever agency the popular mind fixes the responsibility for high prices upon, there is danger that the burden will be shifted to his shoulders, because he is unorganized and less able to defend himself; and a disturbance of economic conditions at once affects his business and adds to its uncertainties. It becomes difficult for him to plan ahead, and he is without means to protect himself from the results of agitation or the whims of the market.

Herein lies an argument for thoroughgoing economic studies, made in a scientific manner, which shall marshal and weigh all the facts and put a scientific interpretation upon them. The farmer is only one factor, but his interest is very large and important. The fact is that the whole industrial system of production and distribution of food supplies is involved. The subject is a complex and complicated one, and is a work for experts.

The question is a much larger one than the ultimate price of potatoes and the accrued profit. It lies at the basis of a fundamental industry, and a reasonable return for brains and capital and labor devoted to it. Upon it rests the opportunity of the largest body of real wealth producers in the world—the development of the condition of the farmer and of the people of the country, upon whom the towns and cities have drawn so heavily.

The subject of agricultural economics is a comparatively new one in this country or in Europe, and its field and the utility of its studies have not yet been widely recognized. Its studies have been restricted and more or less fragmentary, and permanent agencies for conducting them have been provided to only a quite limited extent. Such studies as have been made have been largely confined to production rather than to distribution, and have left many large questions bearing on the agricultural industry and its broad relations still to be worked out.

Not only do such economic studies need to be made for the intelligent and wise development of our agriculture, but they are highly desirable in the interest of the general public—the consumer. The interests of the producer and the consumer are in reality very close, but in practice the two are very far apart at present. They are separated by various intermediate agencies which they do not fully realize or understand, and which have the practical effect of depressing prices at one end and expanding them at the other.

There is a nearly virgin field for economic inquiry into the disposal of farm products from the producer to the consumer. Between what the producer receives and what the consumer pays for products which are not manufactured, but are merely handled, a wide margin is nearly always apparent. The question is as to whether the accrued difference is a reasonable and necessary one. And this can not be fully and fairly answered until the economics of the production, transportation, and distribution of various classes of products have been worked out—a thing which has not yet been done for the disposal of any class of farm products in a thorough and scientific manner. Until the margin of difference is satisfactorily accounted for, the public and the farmers alike will query whether they are not being imposed upon.

The question as to what determines prices at the farm and to the ultimate consumer is still an open one. Do the supply and demand, considered in a world sense, determine the price of a given crop, or are there artificial agencies which intervene to diminish or eliminate competition and to set up fictitious prices? What are the factors operative to account for the differences uniformly observed between the prices at the farm and to the consumer, and is this difference a

reasonable one, or is our industrial system unnecessarily cumbersome and expensive to both the producer and the consumer? Questions of this sort are highly important, and seem eminently appropriate subjects of investigation. To be conclusive, such investigations need to be made by men competent to plan and conduct them in a scientific manner, and to weigh the data impartially in the light of existing conditions. The public needs to have this information from a source it can rely upon, and it needs it not only for its protection from imposition, but that it may apply correctives intelligently and possibly simplify and cheapen the process of distribution. A great deal has been done in the latter direction by private interests which have entered into cooperation for that purpose.

The lack of data and of knowledge of the facts are at once conspicuous when a question involving the economics of agriculture is approached. In very few States and for very few branches of the industry have there been anything approaching systematic and thorough economic studies on the extent and cost of production, the machinery and expense of distribution, and the effects of these factors on the condition of the farming industry, on the condition and opportunities of the people engaged in it, and the broader relations of these matters. Such data as are to be had are fragmentary and incomplete, and are not satisfying to a thorough student. They do not enable economics to be taught from a rural point of view in any complete way.

Facts to be of value and a safe basis for reasoning need to be correlated and given their proper weight. Isolated facts are dangerous things when considered out of their environment and given undue proportion. Science is knowledge classified, correlated, and arranged in an orderly manner, and the office of science is to study the sequence of phenomena. In agricultural economics very little of the knowledge on which to base a science is yet available, and very little of the study of the sequence and relations of phenomena or facts to furnish a body of scientific investigation is to be found.

This constitutes one of the present deficiencies in the rounding out of agricultural science and the fund of knowledge. The lack of this knowledge halts the development of the condition of the farmer, for it retards the day when industry and ability on the farm yield the return which they reasonably should, and prevents the farmer and his industry from being assigned to the position they are entitled to occupy. The producer lacks the information he should have to give greater independence and security to his business.

There should be, it would seem, some local agencies which should know the exact status of the agricultural industry at a given time, which should study it in its economic relations. This does not lie in

the field of the experiment stations, and the agricultural colleges can hardly burden themselves with the collection and study of statistics. They can, however, recognize the importance of this subject by establishing departments of rural economics on a basis which will give opportunity for investigation as well as instruction, and these departments can perform an important function by working out methods, in order to develop means of investigation in this field and furnish examples of its utility.

The development of methods is one of the needs at the present juncture, the field is so new and experience so limited. By taking up a restricted problem or field and studying it in a thorough and scientific manner, much might be done to give impetus to investigation, and at the same time broaden the basis of the science. Investigation needs to be stimulated, the field blocked out, and special agencies provided which will deal regularly and continuously with the economic phases of this industry. This opens up an important field for the state departments and boards of agriculture, in which they may extend and supplement the work which is being done by the National Department of Agriculture.

The farmers need advice of a kind which they can not expect the experiment stations to furnish, and which relates directly to their business. Agricultural conditions are changing, and these changes need to be recognized by the farmers in a given locality in shaping their course. Changes in any industry must be gradual and must be made intelligently, but at present there are no established permanent agencies to follow the trend in agriculture, to study the movement in a broad way, and to advise the farmers, or even to give them the facts.

For example, the dairy situation changes in a locality from an increased demand for milk, either from milk contractors or condenseries attempting to draw a supply from a new region. This is complicated by new regulations, new standards, high prices for feed, and a changed basis of selling. The farmer is often perplexed to know whether he should abandon his butter or cheese making or his connection with the creamery, and fit up for the new market for his raw product. It is difficult for him to get information as to the real status of the industry or the experience in other localities. Are the farmers elsewhere prospering under such a system, or is dairying generally declining in that section under the changed economic conditions?

From a broad study of this matter and a knowledge of general conditions, the state department or board of agriculture should be able to give the dairyman the facts which would enable him to shape his course more intelligently. There are some examples of such studies, notably on the economics of milk supply and distribution in New York and London. They do not necessarily effect a change in

the practice at once, but they lay bare the facts and give a basis for action. This in itself is an important first step.

From their isolation and their separateness farmers are deprived of information of a kind which business men of the towns and cities possess. The commercial reports give the business man the information he needs as to the status of the markets and the special demands, but they do not go beyond his field of interest. The producer on the farm is not informed as to the tendencies and the influences which are operative, and can not take advantage of them, but the fact that his business is not elastic makes advice all the more necessary.

Studies of the cost of production are beginning to be made and are already showing some surprising facts. The farmer has had very little data of this sort, even for the production of staples, to guide him in his business. Inquiries into the methods of farm management, the returns from various systems, and the development of systems which are more rational and give a larger return, are also yielding results of much value and importance. These things, while still young in their development, emphasize the field which is open for a special type of inquiry.

Each year brings increasing interest in the problems of agriculture and the development of the agricultural industry. Interest and faith in land are steadily increasing. A large number of people in the towns and cities are turning their eyes countryward, drawn by the prospect of greater freedom and the attractions of country life. This is evidenced by the increasing attention given to agricultural matters in the public press and in magazines, and was shown by the large attendance of city people at the Land and Irrigation Exposition, held in Chicago the past fall.

At the suggestion of the State Commissioner of Agriculture in New York, Prof. L. H. Bailey prepared a pamphlet on the agricultural situation in that State, dealing especially with the so-called abandoned lands, and advocating a survey of agricultural resources. In this he insisted upon a higher rating for agriculture among human occupations, and urged greater faith in the land and its possibilities and its utilization to the best advantage. Instead of continuing to dwell on the discouraging features of farming, he urged that the good side should be set forth, and that "every time we describe one abandoned farm we ought to describe three well-occupied farms."

The Boston Chamber of Commerce has indicated a new interest in Agriculture by the appointment of a permanent committee on that subject, and has issued a very optimistic report upon the future of the New England farm. It states that interest is awakening in various branches of agriculture and in the development and better adapta-

tion of lands, and that the indications point to a remarkable development of the agricultural industry all over New England.

The interest of the railroads in the promotion of agriculture has been exemplified in various ways—by the operation of trains over its lines for institute work, the giving of prizes and scholarships in agricultural colleges, and by other means. Recently the president of a large railway system in the East has announced the policy of establishing several demonstration farms to indicate what can be done with a reasonable expenditure and intelligent management to yield a good living on lands now largely out of commission. The road has purchased a run-down farm for that purpose and plans to buy two others in the near future. As these farms are brought up they will be offered for sale and others purchased. Another road has proposed to purchase one or more run-down farms in New York State, to be turned over to the state department of agriculture or the colleges having courses in agriculture, for the purpose of demonstrating improved farm practice and showing the opportunities in such land.

A similar departure has been made by another railroad system in the East, which, in addition to demonstrating the renovation and utilization of farm land, will aid in the promotion of agriculture by institute work, exhibits, and in other ways. In neither case has the railroad large areas of land to dispose of, as some of the western roads have, but the movement is prompted by a faith in agriculture and a belief in the greater utilization of farm lands.

These and many other things point to a widespread revival of interest in the agricultural industry, which is being furthered by various agencies. Economic and sociological studies are recognized as among the most important to the present development of the business of farming and the conditions under which it is carried on. A great field is here represented, which has only just begun to be occupied, and is not yet fully blocked out. It offers large opportunity for extending the usefulness and influence of the agricultural colleges and the departments which preside over the agricultural interests of the States. Development along these channels seems at the present time especially opportune.

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RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

The relation of investigations on colloids to agricultural chemistry, II, P. Ehrenberg (*Ztschr. Chem. u. Indus. Kolloide, 4 (1909), No. 2–3, pp. 76–86; abs. in Ztschr. Angew. Chem., 22 (1909), No. 28, p. 1415*).—This is a further contribution to the discussion already noted (E. S. R., 21, p. 301).

Colloid substances in cultivated soil, P. Rohland (*Ztschr. Chem. u. Indus. Kolloide, 5 (1909), No. 5, pp. 243, 244*).—Replying briefly to statements by Ehrenberg (see above) the author restates certain points which have been brought out in his own investigations (E. S. R., 21, p. 117). He believes it safe to conclude that the more colloid substances soils contain the more productive they are.

Notes on colloid chemistry as applied to soil investigation, P. Ehrenberg (*Ztschr. Chem. u. Indus. Kolloide, 5 (1909), No. 2, pp. 100, 101*).—Brief historical notes on investigations relating to this subject are given.

Colloidal-chemical processes in wood formation, H. Wislicenus (*Tharand. Forstl. Jahrb., 60 (1909), pp. 313–358, figs. 4; abs. in Chem. Ztg., 33 (1909), No. 102, Repert., p. 442*).—The author comes to the conclusion that the vital process of wood formation is regulated by and dependent upon certain laws of colloidal chemistry.

The question of the nomenclature of chlorophyll chemistry, L. Marchlewski (*Chem. Ztg., 33 (1909), No. 98, p. 871; abs. in Chem. Zentbl., 1909, II, No. 13, pp. 1056, 1057*).—A discussion relating to the terms phaophytin *v.* chlorophyllan and phyllogen. The author also deems it advisable to retain the term alkachlorophyll for the alkali-changed products instead of substituting for it Willstatter's chlorophyllin.

Protein hydrolysis by hydrofluoric acid, L. Hugounenq and A. Morel (*Compt. Rend. Acad. Sci. [Paris], 149 (1909), No. 1, pp. 41–43*).—Gelatin was completely hydrolyzed by a 15 per cent solution of hydrofluoric acid, whereas a 20 to 30 per cent solution of this acid yielded only amino acids with dipeptids and tripeptids. A 35 per cent acid solution gave polypeptids of a more complex structure, and a continued hydrolysis of one of these gave 5 acid amids, viz, arginin, lysin, alananin, phenylalanin, and glycocoll. A 45 per cent solution of the acid gave only diamins. These peptids were not synthetic products.

The action of dilute acid on edestin, G. G. Petrow (*Izv. Moskov. Selsk. Khoz. Inst. [Ann. Inst. Agron. Moscou], 15 (1909), No. 2, pp. 200–218*).—The author reports the results of an experimental study of the action, at different temperatures, of 4 per cent sulphuric acid on crystalline edestin.

According to his summary, the acid has a very marked effect, inducing cleavage to amido acids, organic bases, and ammonia. Peptones to the extent of 50 per cent of the nitrogen present are formed at first, but later the quantity diminishes. The peptones are evidently an intermediary step in the hydrolytic cleav-

age. The different components which make up the protein molecule naturally unite in a similar way in bodies so closely related as edestin and legumin, small differences being explainable as due to secondary processes. It seems fair to conclude that similar results are obtained with strong acid acting for a short time and with dilute acid acting for a long time.

The occurrence of adenin in bamboo sprouts, G. Totani (*Ztschr. Physiol. Chem., 62 (1909), No. 2–3, pp. 113, 114*).—The author reports the presence of adenin in bamboo sprouts.

Contributions to a knowledge of rennet action, W. Van Dam (*Ztschr. Physiol. Chem., 58 (1909), No. 4, pp. 295–330, figs. 3; abs. in Zentbl. Physiol., 23 (1909), No. 12, p. 402*).—The author investigated why the milk of some cows does not coagulate with rennet. The number of hydrogen ions was found to be highest ($0.14-0.32\times10^{-6}$), with milk which coagulated well, but with milk having a deficient coagulation it was $0.16-0.22\times10^{-6}$. He, therefore, concludes that the deficiency of hydrogen ions is not the cause of the noncoagulation of milk, but that this is probably due to a lack of colloidal calcium in the milk.

The influence of chemicals in stimulating the ripening of fruits, A. E. Vinson (*Science, n. ser., 30 (1909), No. 774, pp. 604, 605*).—A preliminary report is made of the successful ripening of dates by exposing them to the vapor of acetic acid for 12 or 15 hours. "At the end of this time they have become transparent nearly to the seed and will then ripen naturally without further treatment. The process can be accelerated by exposing them to sunshine, or more rapidly by heating for some hours to 45° C. The process, it is anticipated, will permit the shipping of dates green and ripening them at their destination as bananas are now handled.

"The fresh, ripe date is very soft and prone to sour quickly, while the unripe fruit is very firm and not easily bruised. Furthermore, the ripe, fresh date deteriorates very rapidly in flavor, due largely to the inversion of the cane sugar. For example, the unripe fruit of the seedling used in these experiments contains 15 or 20 per cent of cane sugar when ready to ripen, but very soon after complete ripeness this cane sugar disappears. This is due to the release of the intracellular invertase at the time of ripening. . . . By artificial ripening at their destination, the more inferior invert sugar varieties can be placed upon the table of the distant consumer with their maximum quota of cane sugar and consequently of flavor.

"After moderate treatment with acetic acid, the tannin of the date has not yet become entirely insoluble but all astringency disappears in the next few hours. The intracellular invertase, however, passes into solution to quite an appreciable extent immediately after the treatment, and probably other intracellular or insoluble catalytic agents are released simultaneously."

The author also studied the effect of other chemical substances on the ripening of dates.

Soy beans and soy bean oil, E. B. Holland (*Massachusetts Sta. Rpt. 1908, pt. 2, pp. 111–119*).—Soy bean oil was extracted from the beans by rolling, heating the mass, and finally pressing by torsion. Analysis of the press cake showed that 55 to 60 per cent of the oil was extracted.

The physical analysis showed that the oil had a dark amber color, specific gravity 0.9206 at 15° C., specific viscosity 8.43 at 70° F. (Boverton-Redwood viscosimeter), refractive index 1.4749 at 20° C., 1.473 at 25°, and 1.4675 at 40°. The mean dispersion was 0.00938 at 20° C., 0.00934 at 25°, and 0.00922 at 40°.

The results of the chemical analysis were as follows: Saponification number 191.95, acid number 1.27, ether number 190.68, 99.37 per cent neutral fat (95.07

per cent fatty acids, 10.42 per cent glycerol), 0.03 per cent unsaponifiable matter, 0.63 per cent free fatty acids.

95.70 per cent total fatty acids.
Neutralization number, 200.57.
Mean molecular weight, 279.99.
- 0.39 per cent soluble fatty acids
- 0.19 Reichert-Meissl number
- 0.11 per cent volatile fatty acids
- 95.31 per cent insoluble fatty acids.
  - Palmitic acid
  - Oleic acid
  - Linoleic acid
- Neutralization number, 200.22
- Mean molecular weight, 280.48

The acidity, sulphite content, and color of gluten feed, P. V. GOLDSMITH (*Massachusetts Sta. Rpt. 1908, pt. 2, pp. 139–148*).—Dark feeds have a stronger acid reaction to phenolphthalein than the lighter ones. The acidity which is present is an apparent acidity, as shown by the results with the indicators phenolphthalein and methyl orange and, further, by sulphate and chlorid determinations. The author, therefore, presumes that the acidity is due to some form of phosphorus. Sulphites were present in only very small amounts, while anilin coloring matter was evident in 80 per cent of all the feeds examined. An aqueous extract of the feed showed a large amount of phosphoric acid, probably in combination with potassium and magnesium, and which may exist in the feed as some organic complex such as the phytin of wheat bran.

Chemical conversion tables, H. B. BATTLE and W. J. GASCOYNE (*Baltimore, Md., 1909, pp. 79*).—This publication is a successor to that published by H. B. Battle and F. B. Dancy in 1885. Its particular application for the agricultural chemist is for the analysis of commercial fertilizers, cotton seed, iron, and food products. New additions made in this edition include alumina, chlorin, sulphur, phosphorus, silicon, manganese, and magnesia tables.

Gravimetric estimation of nitric acid, M. BUSCH (*Ztschr. Analyt. Chem., 48 (1909), No. 6, pp. 368–370; abs. in Jour. Chem. Soc. [London], 96 (1909), No. 561, II, p. 615*).—A reply to Hes (E. S. R., 20, p. 1104). The use of dried filters is deemed objectionable. With reference to the concentration to be employed, the author believes that 10 to 12 cc. of a 10 per cent solution of nitron acetate should be added to 80–100 cc. of the solution to be examined. As Hes employs 5 cc. to 250 cc., and finally 5 cc. to 750–1,000 cc., this may explain his failure to get accurate results with the nitron method for nitrates in water.

Busch's nitron process, P. POOTH (*Ztschr. Analyt. Chem., 48 (1909), No. 6, pp. 375, 376; abs. in Jour. Chem. Soc. [London], 96 (1909), No. 561, II, p. 615*).—To get accurate results, only small quantities of nitron solution should be added at a time. The nitron should be kept in a dark place. The hydrochloric-acid content should not exceed 100 cc. normal solution for every 0.1 gm. of nitrate.

[Colorimetric method for the determination of phosphorus], R. B. GIBSON and C. ESTES (*Jour. Biol. Chem., 6 (1909), No. 4, pp. 349–357*).—An indirect method.

To an aliquot of a solution of a fusion containing about 0.04 to 0.1 per cent of phosphorus are added ammonium hydroxid to a little in excess of neutrality, 5 cc. of an acetic-acid solution (20 gm. of sodium acetate and 100 cc. of 30 per cent acetic acid, filled up to 1,000 cc. with water), and 50 cc. of uranium acetate solution (0.7092 gm. per liter). The mixture is made up to 100 cc. and allowed to stand over night, following which 10 cc. of the clear filtrate is treated with 1.5 cc. of a 10 per cent potassium ferrocyanid solution and diluted to 100 cc. This solution is then compared as to color with a blank (minus the phosphate) which has been prepared in the same way. The calculation is as follows: Unknown : Known=50 cc. : x cc.

Determination of phosphorus in phosphates by the volatilization method, P. JANNASCH and W. JILKE (*Jour. Prakt. Chem., n. ser., 80 (1909), No. 15, pp. 113–127, figs. 2*).—This was done as follows: The phosphate of either iron, chromium, uranium, zinc, nickel, cobalt, or manganese was placed in a silica combustion boat and the whole inserted in the combustion tube, one end of which was packed loosely with glass wool. Carbon tetrachlorid vapor was then passed over the phosphate in the tube, which was heated first at a dull and finally at a red heat. The glass wool served to retain the metal in the tube while the phosphorus passed over into a receiver, possibly as phosphorus oxychlorid, and was estimated as magnesium pyrophosphate.

Phosphatic feed-lime, O. KELLNER (*Landw. Vers. Stat., 70 (1909), No. 5–6, pp. 471–480; abs. in Jour. Chem. Soc. [London], 96 (1909), No. 561, II, p. 617*).—The author recommends a method for determining phosphoric acid whereby 2.5 gm. of the finely powdered feed-lime is placed in a dry 400 cc. flask with 250 cc. of Petermann's citrate solution and the whole shaken ½ hour in the rotary apparatus. The solution is then filtered through a dry filter into a dry beaker and 50 cc. of the filtrate treated with 20 cc. strong nitric acid and 50 cc. of water and boiled for 10 minutes. The phosphoric acid is then determined by precipitation.

The quantitative separation of calcium from magnesium, W. C. BLASDALE (*Jour. Amer. Chem. Soc., 31 (1909), No. 8, pp. 917–922*).—There are three main sources of error in this analysis, namely, the precipitation of magnesium oxalate, the incomplete precipitation of calcium, and errors from occlusion. With a solution containing 0.6 gm. of the sample of calcium and magnesium carbonate, the magnesium not exceeding the calcium, the author proposes to add 3.5 gm. of ammonium chlorid, dilute with 300 cc. of water, boil, and precipitate with 1 gm. oxalic acid. The solution is then neutralized with a 1 per cent ammonium-hydroxid solution, doing it gradually during a period of 5 minutes. When the amount of magnesium is greater than the calcium the method is modified by making the precipitation in 2 stages, just enough precipitant being added during the first to precipitate the calcium.

Determination of sulphuric acid as barium sulphate, J. F. SACHER (*Chem. Ztg., 33 (1909), No. 107, pp. 941, 942*).—After repeating his work (E. S. R., 21, p. 106), the author points out that the losses observed by Ruppin and Folin in this determination are due to the solubility of the precipitate in chlorid of potash, and also to the insufficient excess of the precipitating agent present. The amount of barium sulphate obtained is dependent upon the length of time of heating during and after the precipitation. Precipitation in the cold does not necessitate a large excess of barium chlorid.

A typographical error in the author's original article, "the amount of hydrochloric acid must be 1 per cent," is corrected to read "some 1 per cent hydrochloric acid should be added."

Estimation of potassium in soils as phosphomolybdate, P. DE SORNAY (*Bul. Assoc. Chim. Sucr. et Distill., 26 (1909), No. 10, pp. 978–980; abs. in Jour. Chem. Soc. [London], 96 (1909), No. 561, II, p. 618*).—By adding a definite amount of phosphomolybdic acid to solutions of potassium chlorid, potassium nitrate, and potassium sulphate containing a known amount of potassium, and determining the phosphoric acid in both the filtrate and the precipitate, the author found that potassium phosphomolybdate is not constant in composition.

A modification of Esbach's albuminoid test, KWILECKI (*München. Med. Wchnschr., 56 (1909), No. 26, p. 1330; abs. in Chem. Ztg., 33 (1909), No. 102, Repert., p. 441*).—The modification consists in adding ferric chlorid solution to the acidified urine and precipitating the albumin at 72° C. It is claimed that by this method the albumin can be determined in 2 to 6 minutes.

Methods for fat analysis, E. B. HOLLAND (*Massachusetts Sta. Rpt. 1908, pt. 2, pp. 120–138*).—A description of the usual methods of fat analysis, with some slight modification of the procedures for the purpose of simplicity and uniformity of results in feeding stuffs and butter analyses.

A color reaction for fats, M. E. SCHLUMBERGER (*Abs. in Ztschr. Angew. Chem., 22 (1909), No. 27, p. 1374*).—This is described as a reaction for all fats which contain olein or oleic acid, including castor oil and ricinoleic acid. To 10 gm. of the cooled oil and 10 gm. concentrated sulphuric acid are added a solution consisting of 5 gm. of glucose in 2 gm. of water; this latter solution having been previously cooled to the crystallizing point. Without allowing the mixture to rise above 35° C., 30 gm. additional of sulphuric acid is added, whereupon the solution takes on a red coloration, which on heating on the water bath and agitating constantly changes to a cherry-red and finally a purple coloration.

The determination of milk sugar by the Michaelis and Rona iron method, K. OPPENHEIM (*Chem. Ztg., 33 (1909), No. 105, pp. 927, 928*).—The method as applied to milk is as follows: Ten cc. of milk are diluted with 13 cc. of water and 7 cc. of colloidal iron hydroxid, the iron hydroxid being added drop by drop and shaken during the addition. The mixture is then filtered through a dry filter and the solution polarized with the Schmidt and Haensch polarimeter.

Reactions for lactic and glycollic acids, G. DENIGÈS (*Bul. Soc. Chim. France, 4. ser., 5 (1909), No. 11, pp. 647–649; abs. in Jour. Chem. Soc. [London], 96 (1909), No. 561, II, p. 627*).—For lactic acid a quantity not greater than 0.2 cc. of a 2 per cent solution is warmed at a temperature of 100° C. with 2 cc. sulphuric acid for 2 minutes, cooled and a drop of an alcoholic solution of guaiacol or codeine added. Guaiacol yields a rose-red coloration, and codeine an orange-red coloration. The method for glycollic acid is practically identical except that the solution must be heated to a higher temperature. With it codeine yields a yellow coloration, which changes to violet. Guaiacol gives a violet, changing to brown on diluting with alcohol.

Detection of boiled milk by the microscope, W. MORRES (*Milchw. Zentbl., 5 (1909), No. 9, pp. 416, 417*).—A continuation of the author's work on the microscopical detection of adulteration in butter (E. S. R., 20, p. 1010). The fat globules in unboiled milk are seldom larger than 10 microns, whereas in milk which has been boiled they seem to cohere and become between 20 and 100 microns in size.

Detection of margarin in butter, C. C. BARDELLI (*Hyg. Viande et Lait, 3 (1909), No. 7, pp. 310–312*).—The author draws attention to the fact that the Jahr method is very much simpler and easier to execute than the refractometric, polarimetric, volatile acid determinations, and other existing methods.

[The detection of iron and copper in cheese curd], A. SCHAEFFER (*Milchw. Zentbl., 5 (1909), No. 10, pp. 427–430*).—Testing for iron and copper in the ash or in the cheese curd itself, according to the author's experience, does not yield satisfactory results. He recommends the following procedure for iron, which may also be used quantitatively: To 20 gm. of cheese curd in a porcelain dish add ammonia until all the casein is dissolved. About 20 drops of ammonia generally suffices. Then add 5 drops of yellow ammonium sulphid, knead the mixture, transfer the mass to a piece of filter paper or anything with a white background, and compare the color with the color scale prepared by the author. With copper the results were not satisfactory.

Is formaldehyde produced by boiling solutions of cane sugar? C. H. LAWALL (*Amer. Jour. Pharm., 81 (1909), No. 8, pp. 394–396*).—Cane sugar and jelly distillates were examined as to formaldehyde production and tested against Hehner's, Rimini's, and the anilin acetate tests. The author concludes that cane

sugar does not produce formaldehyde when boiled under ordinary conditions, but that furfuraldehyde is produced, which reacts in such a manner with the Hehner test as to deceive the analyst who relies upon it alone without confirmation by the Rimini test.

Lead number of vanilla extracts, H. L. JACKSON and W. T. MCGEORGE, Jr. (*Jour. Indus. and Engin. Chem., 1 (1909), No. 7, pp. 478, 479*).—It was found that the Winton lead number as applied to vanilla extracts is a constant for any one bean employed, regardless of the percentage of alcohol used in the preparation of the extract. Some further tests seemed to indicate a possibility of utilizing the lead number to indicate the quantity of beans used to make the extract.

[Official methods of wine analysis of the French Ministry of Commerce and Industry] (*Ztschr. Offentl. Chem., 15 (1909), No. 14, pp. 262–268*).—This is a description of all the official methods of wine analysis agreed upon.

Detection of fluorids in wines, C. MENSIO (*Staz. Sper. Agr. Ital., 41 (1908), pp. 819–832; abs. in Chem. Zentbl., 1909, I, No. 12, p. 1046; Jour. Chem. Soc. [London], 96 (1909), No. 561, II, p. 614*).—The method consists in adding to 100 cc. of wine 2 to 3 cc. double normal sodium carbonate solution, heating, and precipitating with calcium chlorid. The precipitate is washed, and heated in a platinum dish with sulphuric acid, exposing the vapors to a wax-covered watch glass having a little bare spot for the fumes to act upon. The test is sensitive to 0.009 per cent.

The determination of saccharin in beer, G. JÖRGENSEN (*Ann. Falsif., 2 (1909), No. 4, pp. 58, 59; abs. in Chem. Ztg., 33 (1909), No. 106, Repert., p. 458*).—In this method 500 cc. of the beer is concentrated to sirupy consistency on the water bath and the residue extracted 2 or 3 times with 96 per cent alcohol. The alcoholic extract is then submitted to distillation and the residue, after adding a few drops of dilute sulphuric acid, extracted with ether. The ethereal extract is evaporated to small bulk, some dilute sulphuric acid and water added, and then oxidized with saturated potassium permanganate solution. The manganese precipitate obtained is taken up with oxalic acid and the solution extracted with ether-petroleum ether. The ether-petroleum ether extract upon evaporation yields the saccharin in crystals.

A simple method of detecting sulphured barley and oats, W. P. CARROLL (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 40, pp. 8, figs. 3*).—The method consists of treating the sulphured grain with zinc and dilute hydrochloric acid and passing the hydrogen sulphid produced into a 2 per cent solution of lead acetate. Tests of unsulphured barleys gave negative results.

Uniform methods for analysis of cotton-seed products (*Oil, Paint and Drug Reporter, 76 (1909), No. 17, pp. 28D, 28E*).—A description of methods proposed by a committee of chemists appointed by the Interstate Cottonseed Crushers' Association. With cotton-seed meal the methods agreed upon for moisture, oil, and nitrogen are stated, also a method for the determination of the fatty acids in soap stock. The committee recommends a water determination in all analyses of cotton-seed meal or cake.

A practical method of detecting peanut hulls in linseed cake, E. COLLIN (*Ann. Falsif., 2 (1909), No. 5, pp. 131, 132; abs. in Chem. Ztg., 33 (1909), No. 107, Repert., p. 464*).—Five gm. of the reduced substance are rubbed up with hot water and filtered through a sieve. The residue is boiled with alkaline water, washed, and treated with sodium hypochlorite. Peanut shells are not decolorized by this treatment and can easily be recognized by their specific gravity and the resistance which they offer when touched with sharp-pointed instruments.

Examination of molasses feeds with the immersion refractometer, A. SCHLICHT (*Chem. Ztg., 33 (1909), Nos. 105, pp. 925, 926; 106, pp. 935, 936*).—Attention is drawn to the fact that the true liter must not be employed without making the necessary corrections. For practical purposes, however, the Mohr cc. liter can be used. For convenience the Nebauer formula $M \frac{w(s-1)-aT}{M(1-T)-s}$ may be split into 3 parts, viz, $[w(s-1)]$, $(-aT)$, and $\left(\frac{M}{M(1-T)-s}\right)$, and the calculation can be so arranged that the percentage of dry substance can be directly obtained. The author states that the refractometer can be used with more certainty and more rapidly than the pycnometer.

A comparison of various methods for the estimation of sugar in urine, C. FUNK (*Ztschr. Physiol. Chem., 56 (1908), No. 5-6, pp. 507-511; abs. in Zentbl. Physiol., 23 (1909), No. 12, p. 401*).—The Bang method for sugar in urine does not give accurate results. The Bertrand method presents none of the inaccuracies.

Report of the senior analyst for the year 1908, C. F. JURITZ (*Rpt. Senior Anal. Cape Good Hope, 1908, pp. 99-124*).—Results of analyses of foods, water, coke, minerals, and miscellaneous agricultural and toxicological materials are given.

Fermentation bacteriology and control of the fermentation industries, W. HENNEBERG (*Gärungsbakteriologisches Praktikum Betriebsuntersuchungen und Pilzkunde. Berlin, 1909, pp. XV+670, figs. 220*).—This book discusses successively the various stages of bacteriology and parasitology. Concrete examples are presented for the study of problems which occur in the routine work of each industry, that is, baking, dairying, brewing, distilling, alcohol and press yeast manufacture, vinegar manufacture, lactic-acid making, and wine making. The pure culture of yeasts and the preparation of all media, air and water examination, a list of the common infections occurring in the above-named industries, and a chapter on parasites which affect the cereals are included.

A study of the micro-organisms of Japanese vinegar, T. TAKAHASHI (*Jour. Col. Agr. Imp. Univ. Tokyo, 1 (1909), No. 1, pp. 103-136, pl. 1*).—In investigating the micro-organisms of "tanezu," which is a kind of Japanese vinegar, the author found most of the fermentation to be caused by bacteria, of which *Bacterium rancens*, *B. aceti*, and *B. xylinoides* were the most important. Of these a number of varieties are recognized, producing from 1 to 5 per cent of acetic acid, and differing as to their fermentation products in alcohol-free media according to the different varieties.

A preliminary note on the varieties of Aspergillus oryzæ, T. TAKAHASHI (*Jour. Col. Agr. Imp. Univ. Tokyo, 1 (1909), No. 1, pp. 137-140*).—In studying the fungus *A. oryzæ*, which plays an important rôle in the brewing of sake, the author has found that there are 3 varieties, differing in their morphological and physiological properties.

Enological studies, W. B. ALWOOD (*U. S. Dept. Agr., Bur. Chem. Bul. 129, pp. 32, fig. 1*).—This consists of two papers.

1. *Experiments in cider making applicable to farm conditions.*—The first of the cider making experiments was made with apples of low grade in hot weather. Apple musts were fermented with yeast types No. 8, 53, 66, and 73 of the Bureau of Chemistry collection. In each instance a portion of the fermented must was racked out into kegs and allowed to go through the entire process of after fermentation, etc., without treatment. The other portion was clarified by passing through a milk separator. Analysis some months later showed that the samples passed through the separator retained about the same sugar content throughout the storage process, while those untreated were prac-

tically dry. The unclarified ciders were superior in flavor, although both ciders were of very fine quality.

A second series of fermenting tests was made with winter apples in cold weather and with the object of establishing a good method of procedure for cider making. It is shown that the casks which were yeasted with pure yeast fermented much more rapidly than those which were allowed to start spontaneously and one yeast gave about 1 per cent more alcohol. It was further shown that some yeasts fermented more sugar than others, and that in one instance an unyeasted batch gave more volatile acid than the others. The alcohol content of the cider ranged in the unyeasted samples from 3.64 to 5.12 per cent; with the yeasted ones the limits were 3.86 to 5.55 per cent.

II. *Notes on the use of pure yeasts in wine making.*—Fermentation experiments were conducted with red wine must, one portion of which was pitched with a Geisenheim wine yeast and the other allowed to ferment spontaneously. The object of the test was to note the changes wrought by fermenting under the different conditions and the procedure was that generally followed in wineries. The final analysis of the pure yeast wine yielded the following: Alcohol 8.77 per cent, reducing sugar 0.297 per cent, and total acidity 0.739 per cent, of which 0.058 per cent was volatile and 0.666 per cent was fixed. The unyeasted sample gave alcohol 9.22 per cent, reducing sugar 0.318 per cent, and a total acidity of 0.664 per cent, of which 0.058 per cent was volatile acid and 0.591 per cent was nonvolatile.

A method of removing dextrose from mixtures of dextrose and levulose, O. ADLER (*Ber. Deut. Chem. Gesell., 42 (1909), No. 8, pp. 1742–1746; abs. in Jour. Chem. Soc. [London], 96 (1909), No. 561, I, pp. 517, 518*).—When benzidin is added to an alcoholic solution containing dextrose and levulose and concentrated by evaporation to a sirupy consistency, most of the dextrose can be removed in the form of the crystalline benzidin derivative. The mother liquor contains most of the levulose.

A manual of sugar chemistry, D. SIDERSKY (*Manuel du Chimiste de Sucrerie. Paris, 1909, pp. 360, figs. 72*).—This volume is chiefly concerned with the analysis of cane, beet, and starch sugars. It is divided into 6 parts, viz: Physics and chemistry of the principal sugars; theory and practice of saccharimetry; methods of analysis of the different saccharin products; methods of analysis of cane and beet sugars, etc.; the starch sugars and products of the glucose industry; and the analysis and judgment of substances employed in the manufacture of sugar, such as animal charcoal, etc.

METEOROLOGY—WATER.

Monthly Weather Review (*Mo. Weather Rev., 37 (1909), Nos. 5, pp. 173–220, figs. 25, charts 7; 6, pp. 221–264, figs. 15, charts 6*).—In addition to the usual reports on forecasts, warnings, weather and crop conditions, meteorological tables and charts for the months of May and June, 1909, recent papers bearing on meteorology and seismology, recent additions to the Weather Bureau library, etc., these numbers contain A Chronological Outline of the History of Meteorology in the United States (see p. 216); An Annotated Bibliography of Evaporation, by Mrs. G. J. Livingston (see p. 217), and the following articles and notes:

No. 5.—A Balloon Among Thunderstorms, by C. J. Glidden; The 24-hour Day, by C. A. Mixer; A Simple Application of the Theory of Probabilities to Weather Prediction (illus.), by C. E. Van Orstrand; A Method of Advertising Climate, by F. A. Carpenter; Tornado at Savannah, Ga., by H. B. Boyer; Meteorology at Colby College, by H. E. Simpson; Methods and Apparatus for the Study of

Evaporation (illus.), by C. F. Marvin (see p. 217); Meteorological Observatory at Teneriffe; The Relations of the Inversions in the Vertical Gradient of Temperature in the Atmosphere to Areas of Heat and Cold (illus.), by H. H. Clayton; Photographing the Leonids of November, 1909; Highest Balloon Ascension in North America, by A. L. Rotch; Tornadoes in Oklahoma; Meteorological Registrations in Samoa, 1902–6—II, Rainfall (illus.), by O. Tetens; Weather Notes from Puerto Plata, Dominican Republic, by R. J. Totten; Tornadoes in Missouri; Tornado at Anniston, Ala., by W. F. Clark; Destructive Storms in Alabama, by E. C. Horton; and Destructive Storms in Michigan, by C. F. Schneider.

No. 6.—Annual Rise of the Columbia River, 1909 (illus.), by E. A. Beals; Frost Damage Prevented by Covers, by A. G. McAdie; The Fireball of September 20, 1909, by F. W. Very; Tornadoes in Kansas and Missouri; Weather Cycles in the Growth of Big Trees, by A. E. Douglass; Squalls and Thunderstorms (illus.), by J. Loisel, trans. by C. Abbe, jr.; Exhibit of Meteorological Data (illus.), by D. T. Maring; Meteorological Registrations in Samoa, 1902–1906—III, Sunshine, by O. Tetens; The Seasons and the Mean Daily Minimum at Mexico, Mo. (illus.), by G. Reeder; Ice Conditions on the Great Lakes, Winter of 1908–9, by N. B. Conger; and the Zodiacal Light.

A chronological outline of the history of meteorology in the United States of North America (*Mo. Weather Rev., 37 (1909), Nos. 3, pp. 87–89; 4, pp. 146–149; 5, pp. 178–180*).—This is a chronology of what are regarded as the most important events in the history of the science of meteorology, which has been prepared "to meet a somewhat general demand for the information it contains."

Report of the Iowa Weather and Crop Service for 1908, G. M. CHAPPEL (*Iowa Yearbook Agr., 9 (1908), pp. 3–57, dgms. 10, chart 1*).—"This report is a condensation of the monthly and weekly bulletins and reports of the Iowa Weather and Crop Service. It contains, in a condensed form, all of the salient climatic features of the year, together with tabulated statistics of the staple soil products of the State."

Fourth annual report of the meteorological committee (*Ann. Rpt. Met. Com. [Gt. Brit.], 4 (1909), pp. 140, pls. 4, fig. 1*).—This consists as usual of administrative reports regarding organization and operations (during the year ended March 31, 1908) in marine meteorology, forecasts and storm warnings, climatology, publications, investigation of the upper air, and miscellaneous subjects, with appendixes as follows: Financial statement, supply of information to the public, lists of observers who sent in "excellent" meteorological logs during the year and of logs and documents received from ships, distribution of instruments, report on inspection of meteorological stations, and lists of persons and institutions from whom publications and meteorological data have been received and to whom publications are sent.

In 1908 the percentage of complete success in forecasts for the British Isles was 58, of the sum of complete and partial successes 92. This is above the average for 10 years.

The mean temperature of the air at sea level, calculated as a function of geographical longitude, latitude, and season of the year, H. FRITSCHE (*Die mittlere Temperatur der Luft im Meeresniveau, dargestellt als Funktion der geographischen Länge, Breite und Jahreszeit. Riga, 1909, pp. 144, pls. 7*).—The calculations are given in detail in tabular form.

On the probable influence of the movement of the moon on atmospheric radioactivity, P. BESSON (*Compt. Rend. Acad. Sci. [Paris], 149 (1909), No. 15, pp. 595–597*).—The meteorological relations of this influence were studied. It was found that with the passage of the moon to meridian the radioactivity increases while the atmospheric pressure decreases, and that with a constant

pressure the radioactivity reaches the maximum with the passage of the moon to meridian and the minimum with the passage to the opposite meridian.

Correlation in seasonal variation of climate, G. T. WALKER (*Mem. Indian Met. Dept., 20 (1909), pt. 6, pp. 117–124*).—Correlation coefficients based upon the exponential law of distribution are worked out.

Cirrus clouds and rainfall (*Rev. Sci. [Paris], 47 (1909), II, No. 18, pp. 561, 562*).—A direct relation between the formation of cirrus clouds and rainfall is traced.

Frost damage prevented by covers, A. G. MCADIE (*Mo. Weather Rev., 37 (1909), No. 6, pp. 224, 225*).—From a brief review of the evidence on the subject the author concludes that the use of open fires as practiced in California orchards, for example, is not sufficient alone to protect plants under severe conditions. "The ideal method of frost protection is a combination of a cover device and a heating device."

The cold waves of south-central Wisconsin, J. L. BARTLETT (*Trans. Wis. Acad. Sci., Arts, and Letters, 16 (1908), pt. 1, No. 3, pp. 289–306, fig. 1, charts 7*).—The nature and causes of these cold waves are explained and it is stated that "the chief damage caused by cold waves in this section is through their overtaking and freezing perishable merchandise which has been shipped during the preceding warm weather. Fruits, vegetables, canned goods, and liquids of all kinds may be seriously damaged by very cold weather. For this reason shippers of such products in the large cities watch weather conditions very closely during the winter months and often hold back their shipments until the temperature is more favorable."

Methods of obtaining advance knowledge of cold waves are explained.

Biology and meteorology, O. PROCHNOW (*Ztschr. Wiss. Insektenbiol., 5 (1909) No. 9, pp. 271–277, dgm. 1*).—The biological relations of meteorological conditions are briefly discussed.

Methods and apparatus for the observation and study of evaporation, C. F. MARVIN (*Mo. Weather Rev., 37 (1909), Nos. 4, pp. 141–146, fig. 1; 5, pp. 182–191, figs. 19*).—In connection with investigations on evaporation undertaken by the Weather Bureau under the supervision of F. H. Bigelow (E. S. R., 21, p. 115), the author was called upon to aid in supplying certain instrumental equipment required for the desired observations. In order to do this in a satisfactory way it was necessary to examine carefully the whole problem of evaporation. This article gives briefly the results of this examination as well as the conclusions reached as to methods and apparatus which seem likely to lead to the most useful and accurate results.

An annotated bibliography of evaporation, Mrs. G. J. LIVINGSTON (*Mo. Weather Rev., 36 (1908), Nos. 6, pp. 181–186; 9, pp. 301–306; 11, pp. 375–381; 37 (1909), Nos. 2, pp. 68–72; 3, pp. 103–109; 4, pp. 157–160; 5, pp. 193–199; 6, pp. 248–252*).—It is stated in the introduction to this bibliography that "the aim of the bibliographer has been not merely to give a list of the titles of publications bearing on or referring to the subject of evaporation, but to set before the reader a sufficiently full summary of each reference, so far as it has been accessible, so that the actual work need not be consulted except in cases where the fullest information is required. Articles bearing on the subject from the point of view of the meteorologist, the agriculturist, the irrigation and hydraulic engineer, have been included wherever found. Hygrometry, however, has been regarded as a distinct subject and only articles which deal with the subject in a general way, or which relate it in any way to the measurement of evaporation have been included. Evaporation from plants, or transpiration, has not been specifically included, as that subject has been so thoroughly reviewed by Burgerstein in Transpiration der Pflanzen."

Underground water in crystalline rocks, F. G. Clapp (*Engin. Rec., 60 (1909), No. 19, pp. 525–527, figs. 3*).—This article deals with the mode of occurrence of water in crystalline rocks and the sinking of wells to obtain a water supply under such conditions.

It is stated that it is safe to assume "that a well drilled in crystalline rocks will, with about 90 per cent of probability, strike enough water to supply a family for domestic purposes. The probability that enough water will be found within 100 ft. of the surface is about 85 per cent. It is not well to give up without sinking at least 200 ft., but drilling over 200 ft. is not advised, although a few wells have got water at greater depths. If a well owner is unfortunate and does not obtain sufficient water at that depth, he is advised to sink a second well 100 ft. or more distant, and the chances are good that he will be successful in the second attempt if not in the first.

"Although water in these rocks is moderately charged with mineral matter, they are not hard, and are not known in many cases to contain sufficient iron or other mineral to interfere with their use. They are good for laundry and boiler purposes, but the supply is seldom sufficient for large plants. The cost of drilling in these rocks is high, but deep wells in them will always pay in the long run."

The selection of a water supply, H. N. Ogden (*Proc. Ann. Conf. Sanit. Off. N. Y., 8 (1908), pp. 161–171, dgms. 2*).—The conditions and requirements of a wholesome water supply are explained.

The location, construction, and care of wells, L. M. Wachter (*Proc. Ann. Conf. Sanit. Off. N. Y., 8 (1908), pp. 172–182*).—The general requirements in the location, construction, and care of wells are explained.

The pollution of streams by domestic sewage and industrial wastes, T. Horton (*Proc. Ann. Conf. Sanit. Off. N. Y., 8 (1908), pp. 136–146*).—The danger from this source is pointed out.

Report on sewerage and water supplies, H. M. Herbert (*Ann. Rpt. Bd. Health N. J., 32 (1908), pp. 265–452, pls. 4*).—This is a report of the state sewerage commission and of the division of sewerage and water supplies of the New Jersey State Board of Health for the year which began November 1, 1907. It contains detailed reports on various water supplies, sewerage systems, and disposal plants throughout the State, and discusses the danger of polluted water as a means of directly or indirectly transmitting disease. The rapidly growing need for careful supervision of public water supplies, including thorough inspection of the entire watershed from which the supplies are drawn, is strongly emphasized.

Attention is also called to railroads as a source of danger in the spread of disease.

It is stated that the artesian well supplies of New Jersey are in good condition. The waters, however, are not always wholly acceptable to the consumer on account of the extreme hardness or excess of iron.

The surface supplies of the State are filtered and in most cases well purified. The filtration plants in some cases were found to be in bad condition and had become an additional source of pollution to the water.

Purification of potable waters (*Bul. Off. Internat. Hyg. Pub. [Paris], 1 (1909), No. 3, pp. 206–220*).—This is an extract of the reports of city officials having charge of the water and drainage of Paris, and describes briefly the various methods which are being employed for obtaining a pure water supply for the city.

SOILS—FERTILIZERS.

Electrochemical methods in soil investigations, F. K. Cameron (*Trans. Amer. Electrochem. Soc., 15 (1909), pp. 559–567; abs. in Chem. Abs., 3 (1909), No. 21, pp. 2601, 2602*).—It is stated that "the chemistry and physics of the soil as related to crop production is primarily a solution study, and, speaking generally, the electrochemical methods which have proved effective in studying solutions elsewhere are all more or less applicable to soil studies."

The article discusses the application of the Wheatstone bridge in the determination of salt content, temperature, and moisture in soils, and in solution and absorption studies; the electro-analysis of soils; and the use of the Ostwald half-cell in the determination of the concentrations of dissolved material held close to the soil grain surfaces.

"One of the most useful instruments which has been devised for soil work is a slide wire bridge, of a form which can be readily carried into the field for observations there as well as in the laboratory. The essential feature of this bridge is a circular wire so calibrated that the ratio of the bridge arms is read directly, and by a special attachment a slight turn of the wrist will enable one to read resistances of 10 to 100 ohms, from 100 to 1,000 ohms, and from 1,000 to 10,000 ohms. The whole apparatus, with dry battery induction coil, telephone, and other attachments, is conveniently packed in a small case measuring 8 by 7 by 7 in. and weighing approximately 6 lbs. In areas where there is an accumulation of soluble salts or 'alkali,' the amount of alkali in the soil can be determined approximately by mixing so much distilled water with the soil as it will take up without allowing any free water to flow from it—in other words, saturating the soil—placing the saturated soil in a hard rubber cell of known dimensions, fitted with parallel electrodes. These electrodes each form a part of the cell and are then slipped between spring contact-clips on the bridge box and the resistance read off, the temperature of the wet soil being taken at the same time by means of a small thermometer. The saturation of the soil is accomplished with great readiness and precision after a little practice, as well as the estimation of the texture of the soil; with this data the salt content of the soil can be readily read off from tables previously prepared."

The same principle has not been so successfully applied in the determination of moisture on account of the difficulty of securing good soil contact of the electrodes.

The physical properties of soils, R. Trnka (*Die physikalischen Eigenschaften des Bodens. Prague, 1909, pp. 24, figs. 3*).—This is a description and report of tests of modifications of Kopecký's methods for determination of the volume weight and porosity of soils. The object of these modifications was to obtain an accurate, rapid, and easy method of determining the physical properties of the soils in place. The special apparatus devised is described and the importance of determining these properties under natural conditions is discussed.

The influence of lime on the movement of water in soils, E. Blanck (*Landw. Jahrb., 38 (1909), No. 5–6, pp. 715–758; abs. in Deut. Landw. Presse, 36 (1909), No. 87, p. 931; Chem. Abs., 4 (1910), No. 1, pp. 73, 74*).—The investigations on this subject were made with sandy loam soil to which lime was added at the rate of 20 gm. per 1,000 gm. of soil. Glass pots containing 1,000 gm. of soil were used and the carbon dioxid content of the soil was determined at intervals during the experiments. Studies of the effect of the lime on the capillary rise of water, water capacity, and hygroscopicity of the soil were also made.

It was observed that the caustic lime applied to the soil was converted into carbonate of lime to a depth of 6 cm., slowly in undisturbed soil but more

rapidly when the soil was stirred. Carbonate of lime had almost no effect (possibly a slight increase) upon the rise of water from below and caustic lime reduced the capillary rise of water almost in proportion to the amount of lime used. It also increased the water capacity of both air-dry and moist soils. Carbonate of lime in the form of ground limestone reduced the water capacity in both cases. Precipitated lime was without effect on air-dry soils but increased the water capacity in moist soils.

Caustic lime increased the permeability of the soil, especially in case of moist soils. Carbonate of lime, both as ground limestone and as precipitated carbonate, reduced the permeability in case of air-dry soils and increased it in case of moist soils. Caustic lime was rapidly washed out of the soil by water, but carbonate of lime, either as limestone or as precipitated carbonate, was not dissolved.

Evaporation was most rapid from unlimed soil. The soil receiving caustic lime contained the largest amount of moisture at the end of the evaporation experiments, while that receiving carbonate of lime was intermediate in this respect between the unlimed soil and that receiving caustic lime. As far as the appearance would indicate, however, the limed soil dried out most rapidly.

The hygroscopicity of the soil was reduced to the greatest extent by the caustic lime and least by the precipitated carbonate.

The author is careful to point out that these results were obtained with a light sandy loam soil and might not be applicable to soils in general.

The action of commercial fertilizers on percolation of water in soils, E. Blanck (*Landw. Jahrb., 38 (1909), No. 5-6, pp. 863-869; abs. in Chem. Zentbl., 1909, II, No. 22, pp. 1888, 1889*).—In the investigations reported it was found that the addition of kainit, superphosphate, nitrate of soda, sulphate of ammonia, caustic lime, and calcium carbonate to a sandy loam soil containing 10 to 11 per cent of water at rates of 1 per cent of the soil decidedly accelerated percolation in all cases except with nitrate of soda, which decreased it. The increases were especially marked in case of superphosphate and caustic lime. In soils containing 1 per cent of water only the lime accelerated percolation, all other materials decreasing it. With air-dry soils the capacity to retain water was less with all fertilized soils except those receiving lime than with unfertilized soils. Soils treated with nitrate of soda showed the lowest water capacity.

The soil considered as a transformation laboratory, Maizières (*Engrais, 24 (1909), No. 38, pp. 1048-1051*).—The soil processes by which plant food is rendered available are discussed.

Investigations on assimilable potash in soils, T. Biéler (*Ann. Agr. Suisse, 10 (1909), No. 4, pp. 161-184*).—Potash was determined in a number of soils from different parts of Switzerland by means of various solvents, including concentrated cold hydrochloric acid, ammonium chlorid, boiling water, and water containing carbon dioxid. The analytical results are compared with the results of field experiments with different fertilizers.

The results indicate that extraction with water containing carbon dioxid gives results for both assimilable potash and phosphoric acid more comparable with the results of field experiments than those obtained with concentrated or dilute acids. As a rule soils containing less than 0.15 to 0.2 per cent of potash soluble in carbonated water need potash fertilizers. Calcareous soils yield slightly less potash when treated with carbonated water than noncalcareous soils. Contrary to common belief it was found that clay soils are sometimes much poorer in potash than light soils. Soils containing less than 2.5 per cent of total phosphoric acid and 0.15 per cent of potash soluble in carbonated water were in need of phosphatic fertilizers.

Contribution to the knowledge of humus compounds, E. DONATH (*Ztschr. Angew. Chem., 22 (1909), No. 30, pp. 1491, 1492; abs. in Chem. Zentbl., 1909, II, No. 13, p. 1074*).—A critique of an article by Miklauz on this subject (E. S. R., 21, p. 220) showing the agreement between the latter's results and those of earlier work by the author on the same subject.

Investigations on Azotobacter chroococcum, S. KRZEMENIEWSKI (*Bul. Internat. Acad. Sci. Cracovie, Cl. Sci. Math. et Nat., 1908, No. 9, pp. 929–1051, pl. 1, figs. 2; abs. in Ztschr. Landw. Versuchsw. Österr., 12 (1909), No. 6, pp. 558, 559*).—A report of these investigations has already been briefly noted from another source (E. S. R., 21, p. 313). This is an elaborate memoir giving a detailed account of the author's investigations and containing a bibliography of 29 references to the literature of the subject. The following are among the more important results referred to in the summary of the memoir:

Azotobacter chroococcum fixes very small amounts of nitrogen in pure cultures in ordinary nitrogen-free nutrient media. Fixation is decidedly increased by the addition of soil humus either as free humic acid or as salts of potassium, sodium, or calcium. Fixation varied, however, with humus derived from different soils. Artificial humus prepared by boiling sugar with acids could not replace soil humus as an aid to fixation of nitrogen. Natural humus boiled with hydrochloric acid was much less effective as an aid to fixation than that not so treated. The treatment with acid dissolved a considerable part of the nitrogen compounds of the humus. The humus served as a source both of carbon and of nitrogen.

For each gram of glucose used Azotobacter fixed 17 mg. of nitrogen, and for the formation of 1 gm. of dry substance it required 6 gm. of glucose. The metabolic products of Azotobacter included acids, alcohol, and hydrogen. Azotobacter was shown to be distinctly aerobic. The optimum temperature for its activity was about 28° C. and the limits of its activity appeared to lie between 9 and 33°. The nitrogen-fixing power of the organisms was apparently unaltered after it had been bred for almost a year in an artificial nutrient medium.

Radiobacter and other bacteria exerted no influence on the nitrogen fixation by Azotobacter. Its nitrogen-fixing power, however, appeared to vary according to its origin, indicating different physiological races of the organism. In the nutrient solution obtained from Azotobacter cultures nitrogen compounds were obtained of which neither the origin nor the composition are definitely known.

The bearing of carbon determinations upon nitrogen fixation in soils, P. EHRENBERG (*Fühling's Landw. Ztg., 58 (1909), No. 18, pp. 663–671*).—The relation of the carbon supply in the soil to the activity of nitrogen-fixing organisms is discussed.

Some conditions favoring nitrification in soils, T. L. LYON and J. A. BIZZELL (*Science, n. ser., 30 (1909), No. 778, pp. 773, 774*).—Nitrification tests of samples of soil from limed and unlimed plats and from plats on which leguminous and nonleguminous plants were grown gave results pointing to the conclusion "that the presence of a certain degree of basicity in the soil, and possibly the growth of certain nodule-bearing legumes, are each favorable to nitrification in the soil. These and other conditions may account for very considerable differences in nitrification tests in different soils."

A contribution to our knowledge of the nitrogen problem under dry farming, F. J. ALWAY (*Abs. in Chem. News, 100 (1909), No. 2600, p. 151; Chem. Abs., 4 (1910), No. 1, p. 74*).—Determinations of nitrogen in samples of soils from different parts of the arid region are used as a basis for the discussion of the question of the loss and maintenance of nitrogen in such soils.

It is pointed out that fallowing, which is considered necessary as a means of conserving soil moisture in dry farming, causes decided losses of nitrogen. On the other hand, the use of green manures to increase the nitrogen content of the soil results in a decided loss of water. The author concludes that the nitrogen problem is less likely to become acute in Saskatchewan than in the central and southern parts of the arid region.

The yeast of the soil, W. H. BOWKER (*Trans. Mass. Hort. Soc., 1909, pt. 1, pp. 13-28*).—The yeast of the soil as discussed in this article "is not plant food, but low organisms of life which exist in the soil and but for which agricultural soils would be practically barren." The article discusses the relation of bacterial activity to composting, drainage, and cultivation, the potential fertility of the soil, the maintenance of the fertility balance, the use of stable manure and commercial fertilizers, and intensive agriculture.

Inoculation of the soil with the bacteria of leguminous plants, L. GRANDEAU (*Jour. Agr. Prat., n. ser., 18 (1909), No. 42, pp. 529, 530*).—This is a brief summary of tests of various methods of soil inoculation with cultures of organisms which fix nitrogen in symbiosis with leguminous plants.

Inoculation experiments with tubercle bacteria from different sources, A. G. DOYARENKO (*Izv. Moskov. Selsk. Khoz. Inst.* [*Ann. Inst. Agron. Moscou*], *15 (1909), No. 1, pp. 89-97, figs. 3*).—The experiments reported were undertaken to determine to what extent the tubercle bacteria of one leguminous plant may be effective with another. The results obtained agree in general with those recently reported by Nobbe, Richter, and Simon (E. S. R., 20, p. 620).

Brack soils, C. F. JURITZ (*[1909], pp. 17, dgms. 3*).—The cause, cultivation, and cure of alkali soils are discussed in this paper, the discussion being based to a large extent upon the results of investigations on this subject in the United States.

Experiments on alkali soils in Temir in the Ural region, B. SKALOV (*Zhur. Opuitn. Agron.* [*Russ. Jour. Expt. Landw.*], *9 (1908), No. 3, pp. 343-361; abs. in Chem. Abs., 3 (1909), No. 21, p. 2601*).—Studies of the composition, characteristic flora, and effect on cultivated plants of the alkali soils of this region are reported.

Experiments with summer wheat during two seasons indicated that the injury observed was generally due to chlorids and less frequently to alkaline carbonates. With ordinary moisture conditions an injurious effect was observed when the chlorin content exceeded 0.01 per cent and the growth of wheat was hindered when the chlorin content was 0.04 to 0.05 per cent. Injurious effects were observed with 0.005 to 0.006 per cent of alkaline carbonates. With higher moisture content these limits were slightly raised. No injurious effect was observed with 0.0032 per cent of sulphuric acid. On virgin steppes there was a distinct correlation between soluble salt content and vegetation. With 0.02 per cent chlorin and 0.005 per cent alkalinity the grasses began to be replaced by *Artemisia maritima*. With a chlorin content of 0.04 per cent and corresponding increase in alkalinity *A. pauciflora*, *Atriplex canum* and *Brachylepis salsa* appeared.

Nebraska soil, G. E. CONDRA (*Nebr. Farmer, 47 (1909), No. 47, pp. 1018, 1019, figs. 5*).—The soils of the loess, sand hill, high plains, and bad land regions of the State are described and their distribution shown.

Notes on the soils of Porto Rico, O. LOEW (*Porto Rico Sta. Rpt. 1908, pp. 40-44*).—The general characteristics of Porto Rican soils, particularly tobacco and cane soils, as shown by samples examined at the station are discussed. Particular attention is given to certain soils which have been found to be unproductive as a result of excess of acidity, alkali, or magnesia (as compared with lime). It is stated that as a rule the soils of cane and tobacco plantations

in Porto Rico show a very favorable percentage of potash and phosphoric acid. "Doubtless various defects exist in these soils, but they are of such a nature that they are easily remedied. Thus the outlook for increase of returns is a very favorable one." The use of lime free from magnesia to correct the unfavorable proportion of lime to magnesia in some of these soils is advocated.

Soils in the vicinity of Berlin, A. ORTH (*Landw. Jahrb., 38 (1909), Ergänzungsb. 5, pp. 1–57*).—This is a report of a detailed study of the origin, formation, chemical and physical properties, and agricultural value of typical soils of this region. The data regarding composition and properties are accompanied by profiles of the principal soil types.

Soil analyses (*Bol. Dir. Geral Agr. Estac. Agron. Lisboa, 9 (1909), No. 3, pp. 32, 33*).—Physical and chemical analyses of samples of soil taken on different dates and at different depths on the experimental field of the agronomic station of Lisbon are reported.

The porphyrite soils of the southern Harz region, H. GRUNER (*Landw. Jahrb., 38 (1909), Ergänzungsb. 5, pp. 59–78, fig. 1*).—A study of the origin, formation, and physical and chemical properties of these soils is reported, with brief notes on their value for agricultural and forestry purposes.

Chemical analyses of some Benadir soils, G. V. ROSSI (*Agr. Colon. [Italy], 3 (1909), No. 2, pp. 116–130*).—Analyses of 41 samples of soils from the territories of Merca, Brava, and Giumbo are given and the agricultural possibilities of these soils are discussed. It is stated that the average temperature of the region is 73° F. and it is pointed out that such a temperature is favorable to the growth of soil organisms.

Note on the soils of Bengal, D. N. MOOKERJEE (*Calcutta: Dept. Agr. Bengal, 1909, pp. 57, map 1*).—Noted from another source (E. S. R., 21, p. 718).

The law of minimum and the law of diminishing soil yields, E. A. MITSCHERLICH (*Landw. Jahrb., 38 (1909), No. 4, pp. 537–552, figs. 2; abs. in Chem. Abs., 3 (1909), No. 21, p. 2602*).—The laws are defined and the degree in which the yield is dependent upon the minimum factor, phosphoric acid, is formulated upon the basis of results of experiments with oats grown in pure quartz sand with fertilizers to which monocalcium, dicalcium, and tricalcium phosphates were added in increasing amounts, the phosphoric acid, however, being always kept the minimum factor.

Soil fertility, T. F. HUNT (*Penn. Dept. Agr. Bul. 177, pp. 98–105*).—This is a brief discussion of some of the results of a long series of experiments at the Pennsylvania Station (E. S. R., 20, p. 1017).

Various smaller experiments with fertilizers and soils, I. S. SHULOV (*Izv. Moskov. Selsk. Khoz. Inst. (Ann. Inst. Agron. Moscou), 15 (1909), No. 1, pp. 116–125, figs. 3*).—The following minor experiments are reported:

Influence of soda and common salt on the yields of flax and millet in sand cultures.—In these experiments soda was applied at the rates of 0.025, 0.05, 0.075, and 0.1 per cent, and common salt at the rates of 0.05, 0.075, 0.15, and 0.2 per cent. The results indicated that while millet was not affected by the addition of soda up to 0.075 per cent, flax was more sensitive. The experiment with common salt was not conclusive.

Influence of chlorin on the development of buckwheat in water cultures.—Various experiments extending over a number of years are reported which indicate that chlorin is not necessary for the normal development of plants.

Cultures with different amounts of moisture in the soil.—In experiments with oats on fertilized and unfertilized podzol soil containing 40, 60, and 80 per cent of the total moisture capacity of the soil it was found that the yields were in all cases larger on the fertilized soil, the greatest increase being obtained in the soil containing the highest percentage of moisture. On the unfertilized

soils the largest yield was obtained with the medium percentage of water. In similar experiments with flax on peaty clay the lowest yield was obtained with the highest moisture content. With the other moisture contents the results were variable and inconclusive. In experiments with tobacco on a sandy soil the largest total yield was obtained with 60 per cent of moisture, the largest relative yield of leaves with 40 per cent. White mustard on the same soil gave the highest yield with the lowest percentage of moisture. Wheat on the same kind of soil gave the highest yield with the medium percentage of moisture and the smallest yield with the least moisture.

Ashes as fertilizer.—Straw ashes were used with good results as a source of potash in a series of experiments.

Culture on alkali soil from the Ural region.—Experiments with summer wheat on mixtures in varying proportions of pure clay soil and an alkali soil are reported. The yield was not affected by the addition of 1 part of alkali soil to 3 parts of clay soil.

Report on vegetation and laboratory experiments, 1904, 1906, and 1907, D. N. Prianishnikov et al. (*Iz Rezultatov Vegetatzionnuikh Opuilov ī Laboratornuikh Rabot za 1904, 1906, ī 1907. Moscow, 1909, pp. VI+237, pl. 1, figs. 65, dgms. 6*).—This is a collection of articles, dealing mainly with fertilizer experiments, and noted from other sources (E. S. R., 22, pp. 126, 127, 128, 129, 130, 208, 222, 223, 224, 226, 228, 230).

Experiments on the fertilizer requirements of soils, A. G. Doyarenko (*Izv. Moskov. Selsk. Khoz. Inst. (Ann. Inst. Agron. Moscou), 15 (1909), No. 2, pp. 137–144*).—Comparative tests of different fertilizers on clay and sandy soils in pot and field experiments are reported, showing that while the influence of the different fertilizers was in the same direction in the pot and field experiments the increase due to fertilizing were much greater in the former than in the latter.

Report of the chemist, P. L. Gile (*Porto Rico Sta. Rpt. 1908, pp. 29–32*).—A brief account is given of the work during 1908, which included mainly examinations of soils and bat guanos, and studies of the decomposition of calcium cyanamid in storage.

Of the 23 samples of soils examined in a general way for acidity, lack of humus, and similar unfavorable conditions, many were found to be decidedly acid, and some were found to be unproductive on account of a strongly alkaline condition. A stimulating effect on pineapples as a result of treatment of some of the soils with carbon bisulphid is reported.

Examinations of 16 samples of bat guano from caves in different parts of the island showed nitrogen varying from 0.04 to 9.27 per cent, phosphoric acid 0.75 to 21.42 per cent, and potash 0.05 to 1.9 per cent. In the samples showing the highest percentages of nitrogen this constituent was found to be largely in the form of unavailable chitin derived from undecomposed wing and body coverings of insects.

Analyses are reported which show that the nitrogen in calcium cyanamid stored in an open bin fell from 13.05 per cent, August 8, to 10.89 per cent, December 10. The nitrogen escaped largely, if not entirely, in the form of ammonia.

An analysis of nitrate of soda, F. Schulze (*Ztschr. Landw. Versuchsw. Österr., 12 (1909), No. 7, pp. 586, 587*).—Samples taken from 3 different sacks showed marked variation in nitrogen content. The average composition of the mixed samples was nitrate of potash 7.69, nitrate of soda 36.93, magnesium sulphate 17.79, sodium sulphate 0.66, sodium chlorid 30.31, sodium chlorate 0.61, insoluble matter 1.11, and water 1.43 per cent.

Precautions to be taken in employing nitrate of soda as a top-dressing, Hitier (*Engrais, 24 (1909), No. 23, pp. 630, 631; abs. in Chem. Abs., 3 (1909),*

No. 21, p. 2602).—The injury resulting to beets from top-dressing with nitrate of soda in dry weather is explained on the basis of Müntz and Gaudechon's investigations (E. S. R., 21, pp. 23, 621) as due to a localized and concentrated solution of the salt.

The great guano deposits of Peru (*Bul. Internat. Bur. Amer. Repub.* (*English Sect.*), *29* (*1909*), *No. 5, pp. 884–891, figs. 5; Sci. Amer. Sup., 69* (*1910*), *No. 1775, pp. 28, 29, figs. 5*).—The guano deposits are described and the history and present status of the industry are briefly discussed. Attention is also called to the proposal to protect the guano-producing birds and thus to insure a continuance of the supply of guano.

The development of the ammonia industry in gas works during the last fifty years, R. W. Hilgenstock (*Chem. Engin., 10* (*1909*), *No. 3, pp. 77–83, figs. 12*).—Progress in processes and apparatus, and cost of production by certain German processes are reviewed.

Brief statistical notes on sulphate of ammonia, Siemssen (*Deut. Landw. Presse, 36* (*1909*), *No. 93, p. 993, dgms. 2*).—The production and consumption of sulphate of ammonia in Germany are presented in notes and diagrams. It is shown that the production increased from 79,000 tons in 1895 to 291,000 tons in 1908, while the consumption increased from about 50,000 tons in 1895 to over 310,000 tons in 1908. The export increased from an insignificant amount in 1895 to about 70,000 tons in 1908. The imports have been very variable, but were only slightly greater in 1908 than in 1895.

Ammonia from soot, J. E. Steely (*Power and Engin., 31* (*1909*), *No. 22, p. 929*).—The reactions by which ammonium compounds are produced in the combustion of coal are explained and attention is called to the importance of preventing this source of waste. It is estimated that with a plant using 100 tons daily of coal containing 1 per cent of nitrogen and 2 per cent of sulphur there would be produced more than 4 tons of ammonium sulphate per day worth over $200.

On the electrochemical fixation of atmospheric nitrogen, A. Zammarchi (*Comment. Ateneo Brescia, 1908, pp. 131–180, pl. 1, figs. 13*).—This is a review of the different methods of obtaining nitrogen from the air. A bibliography of 61 references is appended.

Manufacture of lime nitrogen, II, F. Foerster and H. Jacoby (*Ztschr. Elektrochem., 15* (*1909*), *No. 21, pp. 820–834, figs. 4*).—This is a continuation of a previous discussion of the subject (E. S. R., 19, p. 423) and deals particularly with the relation of temperature with and without addition of other substances (calcium chlorid and fluorid and potassium chlorid) to the rate of formation of calcium cyanamid. Observations, especially upon the self-heating of the mass accompanying the formation of the cyanamid, are recorded in detail.

The industry of cyanogen derivatives as related to atmospheric nitrogen, M. Manuelli, trans. by M. Quesneville (*Engrais, 24* (*1909*), *Nos. 32, pp. 887–893; 34, pp. 941–943*).—The history and present status of this industry are quite fully stated and the principles underlying the processes employed are explained.

The cyanamid industry of France, C. Pluvinage (*Bul. Soc. Encour. Indus. Nat.* [*Paris*], *111* (*1909*), *No. 3, pp. 549–562, figs. 3; abs. in Nature* [*London*], *81* (*1909*), *No. 2077, pp. 222, 223*).—This article describes the plant and methods of manufacture used at Notre Dame de Briançon, France, where abundant water power is available. Results of tests of the fertilizing value of the cyanamid are also reviewed. The author concludes as a result of his observations that the material may be used with advantage at rates of from 150 to 250 kg. per hectare (133.5 to 222.5 lbs. per acre) applied before planting. It may be

mixed with basic slag or potash salts but should not be mixed with superphosphate.

The new nitrogenous fertilizers in our agriculture, E. De Cillis (*Ist. Agr. Siciliano "Valdisavoja" Relaz. 1906–1908, pp. 111–115*).—The author discusses briefly the various sources of nitrogen for agricultural use, and gives a brief description of the different methods of obtaining nitrogen from the air. Conclusions regarding the changes that calcium cyanamid undergoes in the soil and the results of culture experiments at different places are summarized.

Various experiments with calcium cyanamid, E. De Cillis (*Ist. Agr. Siciliano "Valdisavoja" Relaz. 1906–1908, pp. 117–130, fig. 1*).—Two series of experiments are reported, the first of which is a study of the changes in nitrogen content which take place when calcium cyanamid is exposed to the air. From this it is concluded that calcium cyanamid exposed to the air absorbs a considerable quantity of moisture, resulting in an increase of volume and of weight and a decrease in percentage of nitrogen; the decrease in the percentage of nitrogen corresponds roughly to the increase in weight. There is no perceptible loss of ammonia nor of other volatile nitrogenous compounds. The limits of increase in weight and of the corresponding decrease in the percentage of nitrogen are extremely variable and are proportional to the humidity of the atmosphere. The daily increase in weight was from 0.16 to 1.4 per cent of the weight of the original substance and the relative loss of nitrogen varied from 0.028 to 0.19 per cent per day.

The second series of experiments reported is a comparison of calcium cyanamid with other nitrogenous fertilizers, namely, sulphate of ammonia, nitrate of soda, and dried blood, applied to corn for forage and to sugar beets. Calcium cyanamid gave results about equal to those obtained from nitrate of soda and decidedly superior to those from sulphate of ammonia. As a top-dressing it was not so effective as when broadcasted before planting.

Fertilizer experiments with lime nitrogen, J. Behrens (*Ber. Landw. Vers. Anst. Augustenb., 1906, pp. 40–42*).—Plat experiments on barley with lime nitrogen, nitrogen lime, and nitrate of soda are briefly reported. The three substances were applied at rates furnishing equal amounts of nitrogen. The lime nitrogen and nitrogen lime were applied 7 days before seeding and the nitrate of soda as a top-dressing some time after seeding.

The results with the nitrate were decidedly better than with the other two substances. The examination of the grain with reference to nitrogen content gave no results which could be ascribed to the varying effect of the different fertilizers.

The influence of calcium carbonate on transformations of cyanamid in the soil, P. D. Verevkin (*Izv. Moskov. Selsk. Khoz. Inst. [Ann. Inst. Agron. Moscou], 15 (1909), No. 2, pp. 193–199, dgm. 1*).—The principal results of the investigations here reported are given in a diagram, which indicates that the addition of calcium carbonate interfered somewhat with the formation of ammonia but promoted nitrification of cyanamid in the soil.

The agricultural value of lime nitrogen, W. Frear (*Penn. Dept. Agr. Bul. 177, pp. 78–81*).—This is a brief account of the manufacture and use as a fertilizer of this material. Attention is called to recent experiments indicating that it is well adapted to mixing with superphosphates.

German potash industry, A. M. Thackara (*Mo. Cons. and Trade Rpts. [U. S.], 1909, No. 349, pp. 175–180*).—The importance of this industry from the American standpoint is shown by the fact that one-half of the export from the German potash mines is consumed in the United States. It is explained how the rupture in the German Potash Syndicate has resulted in lower prices to the American consumer with a prospect of further reduction in the future. Statis-

ties of the output of the different salts and of the cost and profits of production of different mines are given.

The output and value of the different salts during 1908 are shown in the following table:

Output and value of German potash salts, 1908.

Description.	Output.	Value.	Average value per ton.
	Metric tons.		
Kainit	2,589,804	$8,812,426	$3.40
Other potash salts	3,500,635	8,064,630	2.30
Muriate of potash [a]	508,622	13,387,738	26.32
Sulphate of potash	55,755	2,037,994	36.55
Sulphate of potash-magnesia	33,149	663,068	20.00
Total	6,687,965	32,965,856	.....

[a] Including 117,390 tons of manure salts, worth $1,843,786.

The use of potash in German agriculture in 1908, P. Krische (*Ernähr. Pflanze, 5 (1909), Nos. 20, pp. 161–164, dgm. 1; 21, pp. 173–178*).—A detailed analysis is given of statistics of consumption in the different provinces of the German Empire during the year. It is stated that during 1908, 300,288.23 tons of potash salts were used.

Different forms of phosphoric acid in commercial phosphatic fertilizers, J. Raventós (*Rev. Inst. Agr. Catalán San Isidro, 58 (1909), Nos. 16, pp. 245–249; 17, pp. 263–265; 19, pp. 298–300; 21, pp. 332–335*).—A rather complete summary of the information on this subject is given.

Drying of superphosphates, L. Pierron (*Rev. Chim. Indus., 19, pp. 328–332; 20, pp. 15–27; abs. in Chem. Abs., 3 (1909), No. 21, p. 2605*).—Old and modern methods are described and the conditions necessary to success are explained.

The world's production of mineral superphosphate in 1908, Maizières (*Engrais, 24 (1909), No. 45, pp. 1245, 1246*).—The total production is given as 9,000,000 metric tons, requiring for its manufacture 5,000,000 tons of mineral phosphate. The largest producers were the United States 2,349,000 tons, France 1,608,000 tons, Germany 1,386,000 tons, and Italy 1,080,000 tons.

The phosphate deposits of the United States, F. B. Van Horn (*U. S. Geol. Survey Bul. 394, pp. 157–171*).—The various phosphate deposits in the United States are described and statistics of their production and exportation are given. Special emphasis is laid upon the importance of conserving the phosphate resources of the United States.

Production of phosphate rock in Florida, E. H. Sellards (*Proc. Fla. State Hort. Soc., 22 (1909), pp. 138–141*).—This is a brief statement regarding the development and present status of phosphate mining in Florida. Attention is called to the large loss of floats in ordinary methods of milling and to the importance of finding means of preventing such wastes.

"Humifera" as a fertilizer, E. De Cillis (*Ist. Agr. Siciliano "Valdisavoja" Relaz. 1906–1908, pp. 131–141*).—This is a fertilizing material made from refuse olive skins.

Analysis showed ash 12.69, water 12.61, organic nitrogen 1.65, phosphoric acid 0.43, and potash 1.61 per cent. The ash analysis gave phosphoric acid 3.39, potash 12.79, various salts, carbon dioxid, etc., 22.4, and insoluble matter 61.42 per cent.

From the experiments reported the general conclusion is drawn that "humifera" is a good organic fertilizer and of value in regions where stable manure

is scarce. It is not suitable for rapidly growing crops, but may be used in orchards and in general where a fertilizer of slow action is desired.

Report of the fertilizer division, H. D. HASKINS (*Massachusetts Sta. Rpt. 1908, pt. 2, pp. 38–45*).—A brief account is here given of fertilizer inspection and of the examination of materials sent to the station by farmers and farmers' organizations. During the spring of 1908, 624 samples of fertilizers representing 400 distinct brands were collected and 454 samples were examined. The increase in the use of high grade fertilizers is noted and commended.

The inspection of commercial fertilizers in 1907 (*Rpt. Bd. Agr.* [*N. H.*], *30* (*1907–8*), *pp. 298–312*).—The results of inspection of 94 brands of mixed fertilizers and 9 samples of chemicals offered for sale in New Hampshire are reported. Of the fertilizers examined, 20 brands were found to be deficient in one or more constituents to an extent which would reduce their value below that of the guaranty. The deficiencies, however, appeared to be accidental rather than intentional.

Analyses and valuations of commercial fertilizers, C. S. CATHCART ET AL. (*New Jersey Stas. Bul. 223, pp. 3–39*).—This bulletin reports analyses and valuations of 498 samples of fertilizers representing 305 commercial brands and including also 136 samples of fertilizer supplies, 10 home mixtures, and 35 special compounds.

Analyses of commercial fertilizers, W. FREAR (*Penn. Dept. Agr. Buls. 173, pp. 57; 185, pp. 87*).—These bulletins contain reports of the inspection of fertilizers in the State from August 1, 1908, to August 1, 1909, and include analyses of 1,105 samples of fertilizing materials.

AGRICULTURAL BOTANY.

The influence of various salts on the germination of corn, OLGA and ELIZABETH CHUDINUI (*Izv. Moskov. Selsk. Khoz. Inst.* (*Ann. Inst. Agron. Moscou*), *15* (*1909*), *No. 2, pp. 230–234, figs. 2, dgm. 1*).—The experiments described by the authors were undertaken to determine the influence of calcium salts on the germination of seed, the results being supplemented by a study of the rôle of other common nutrient substances. The experiments were carried on with corn in modified water cultures, comparisons being made of the growth in distilled water, a complete nutrient solution, and solutions lacking various elements, such as lime, nitrogen, potash, phosphorus, and magnesia.

The seedlings were grown for 10 or 20 day periods, at the end of which time they were collected, the cotyledons separated from them, and both dried. The length of stems and roots was measured, and those collected at the end of the 10-day period, when the reserve material of the seed was not yet exhausted, indicated that calcium plays a more important rôle than the other elements, inasmuch as its absence from the nutrient media resulted in the least growth. At the end of the 20-day period the results were still more striking, the solution deficient in lime giving the least growth of any of the solutions, and even less than that produced in distilled water.

Influence of electricity on micro-organisms, G. E. STONE (*Bot. Gaz., 48* (*1909*), *No. 5, pp. 359–379, figs. 2*).—The results of investigations showing the influence of electricity on the growth and multiplication of micro-organisms are given. The studies were carried on to determine the influence of electricity on bacteria in water, milk, and soils, as well as the influence of electrical stimulation on yeasts.

The studies with water were taken up primarily to determine the possibility of obtaining pure water by means of electricity, but it was soon found that instead of a decrease in the bacterial content there was an increase from the

electrical stimulation. This was found to be quite constant where the strength of the current was not too great.

Similar results were obtained with milk, and where static electricity was used a positive charge was found to favor the development of bacteria to a very considerable extent. Where heavy charges were used the number of organisms decreased very decidedly, but feeble electrical currents and small static charges acted as stimuli to bacteria in milk, increasing their number perceptibly. In this connection it is stated that conditions during thunderstorms may accelerate bacterial action by electrical stimulation and thus increase the number of bacteria and incidentally hasten souring.

As a result of all the experiments in the growing of plants, it was found that when currents of 0.1 to 0.6 milliampere were used all forms of plant life were stimulated.

The stimulating effect of weak currents on yeast is shown in the increased amount of carbon dioxid given off by the yeast.

The effect of various colored lights on carbon dioxid assimilation, H. Kniep and F. Minder (*Ztschr. Bot., 1 (1909), No. 10, pp. 619–650, fig. 1*).—Studies were made with *Elodea canadensis* to determine the effect of different colored lights on carbon dioxid assimilation. The usual claim that it is the red rays which are principally concerned in increasing assimilation was found to be only partially true. Other rays of the spectrum that have short wave lengths were found to stimulate assimilation to a marked degree.

Preliminary observations on the transpiration current in submerged water plants, D. Thoday and M. G. Sykes (*Ann. Bot. [London], 23 (1909), No. 92, pp. 635–637*).—On account of the possible bearing of the subject on the explanation of the ascent of water in tall trees, the authors have made an investigation of the transpiration current in submerged plants, studying various species of Potamogeton and other aquatics. The results showed that there was a decidedly rapid movement of water in detached rootless stems of *P. lucens* and that this current was largely dependent on the leaves.

Investigations of the beans of Phaseolus vulgaris at different stages of growth, U. Pfenninger (*Ber. Deut. Bot. Gesell., 27 (1909), No. 5, pp. 227–234; abs. in Jour. Chem. Soc. [London], 96 (1909), No. 562, II, p. 696*).—The author has established the translocation of various nitrogenous compounds from the pod to the seed, his experiments showing that the decrease of nitrogenous substance in the pod is accompanied by an increase in the seed.

In the early stages of development 1.41 per cent of nitrogen was found present in the pods as protein and 1.65 as nonprotein. In the final stages the total nitrogen was 0.88 per cent, of which 0.87 per cent was protein. The total nitrogen in the seeds was 5 per cent in the first stages, 3.59 per cent being protein and 1.41 per cent nonprotein. In the final stage the total nitrogen was 4.23 per cent, of which 4.01 per cent was protein. When the seed was fully ripe it was found to contain more nonprotein nitrogen than in the earlier stages of development.

The concentration of asparagin in different portions of seedlings of Vicia faba, Lydia Krestovnikova (*Izv. Moskov. Selsk. Khoz. Inst. (Ann. Inst. Agron. Moscou), 15 (1909), No. 2, pp. 235–237*).—Previous experiments of Prianishnikov have shown that the concentration of asparagin becomes greater in the seedling than in the cotyledon as the growth of the plant is developed. The present investigation was undertaken with the object of determining whether the concentration of asparagin is the same in the upper and lower portions of the seedlings. Beans were germinated in sand and transferred to a netting placed over distilled water and the cultures maintained for 14 days. After this time the cotyledons and radicles were separated from the rest of the plant and the asparagin content of the upper and lower portions of the stems determined.

From the data obtained it seemed that there was practically no difference in the proportion of asparagin in the upper and lower portions of the two-weeks-old stems. While there was considerable fluctuation between individuals, the determinations showed such slight differences that the author thinks they could be disregarded.

Alleged utilization of atmospheric nitrogen by certain special trichomes in plants, F. Kövessi (*Compt. Rend. Acad. Sci.* [*Paris*], *149* (*1909*), *No. 1, pp. 56–58*).—Following the publication of the investigation of Jamieson (E. S. R., 19, p. 127), the author has made a study of the special trichomes which it is claimed are able to store up and utilize the nitrogen of the air. He cultivated a large number of species of plants in hermetically sealed jars and later examined them and found that the trichomes on plants cultivated either in the open air or in atmospheres deprived of nitrogen developed in precisely the same manner. These trichomes on examination showed no evidence that the albuminoid substances contained in them were obtained from the nitrogen of the air.

The presence of a cyanogenetic glucosid in Linaria striata, E. Bourquelot (*Jour. Pharm. et Chim., 6. ser., 30* (*1909*), *No. 9, pp. 385–389*).—The author reports that *L. striata*, a rather common roadside weed, is shunned by sheep, and a study was made to determine the cause. He found the plant to contain a cyanogenetic glucosid which under the action of emulsion gave hydrocyanic acid, benzoic aldehyde, and a reducing sugar, probably glucose.

Investigations on the effect of formaldehyde on green plants, V. Grafe and Emmy Vieser (*Ber. Deut. Bot. Gesell., 27* (*1909*), *No. 7, pp. 431–446, figs. 2*).—In continuation of a line of experiments previously reported (E. S. R., 21, p. 128), studies have been made on the effect of formaldehyde gas on green plants. Bean seedlings were grown in atmospheres containing this gas with and without carbon dioxid and the effect noted. The report is only a preliminary one and the authors state that no deductions are to be drawn from their experiments.

Smoke injury from steam engines, W. Herbig (*Ztschr. Angew. Chem., 22* (*1909*), *No. 39, pp. 1882–1890, figs. 2*).—A review is given of literature showing the injurious effect of smoke and dust from flues of different kinds of industrial works, and attention is called to the injury due to locomotive engines which is attributed not only to sulphuric but also to sulphurous acid given off by them.

Studies in heredity as illustrated by the trichomes of species and hybrids of Juglans, Œnothera, Papaver, and Solanum, W. A. Cannon (*Carnegie Inst. Washington Pub. 117, pp. 67, pls. 10, figs. 21*).—Studies were made of the trichomes of 11 different species and hybrids of Juglans, Œnothera, Papaver, and Solanum, which represent considerable range of life conditions as well as types of variation.

The Œnothera hybrids were found to inherit characters from both parents, but did not revert to either line. Only one type of trichome was found in Papaver which had in the hybrids an intermediate structural character. In the Solanum hybrid as well as in the species two types of trichomes were found, but of these only one was common to both parental lines and the hybrid. The second type found in the hybrid was inherited from *S. guineense*. In the Juglans hybrids examined the first and second generations showed intermediate leaf characters and each hybrid was found to bear all the trichomes found in both parents. In the second generation some abnormal trichomes were found that were evident modifications of the types already existing.

Variation in peas, F. A. Waugh and J. K. Shaw (*Massachusetts Sta. Rpt. 1908, pt. 2, pp. 167–173, dgms. 3*).—In continuation of the previous report (E. S.

R., 20, p. 325) the authors give an account of studies being conducted to determine accurately the variation in a common variety of garden peas. In connection with this work the subject of heredity and correlation of characters is being considered, but nothing has been developed in the way of correlations. The studies in variation showed marked differences in the different strains of peas. In the studies in heredity the second generation gave no very conclusive results.

On self-sterility in red clover, H. WITTE (*Sveriges Utsädesför. Tidskr., 19 (1909), No. 2, pp. 106–110*).—Experiments conducted by the author led to the conclusion that some of the varieties of red clover are entirely self-sterile, and that this is also the case with alsike clover and bird's foot clover.

FIELD CROPS.

Report of the agriculturist, W. P. BROOKS, E. S. FULTON, and E. F. GASKILL (*Massachusetts Sta. Rpt. 1908, pt. 2, pp. 32–36*).—This is a report of work of which previous results have been noted (E. S. R., 20, p. 327). It was conducted with 384 pots in the vegetation house, 136 closed plats, and 313 field plats.

In the experiment begun in 1890 to determine the relative value of barnyard manure, nitrate of soda, sulphate of ammonia, and dried blood as a source of nitrogen, the year's crop was alsike clover mixed with grasses that came into the plats. The relative rank of these materials for the year was dried blood, nitrate of soda, barnyard manure, and sulphate of ammonia. The average percentage basis for all results secured since 1890 is as follows: Nitrate of soda, 100; barnyard manure, 81.57; sulphate of ammonia, 60.18; and dried blood, 68.40.

"Since a pound of nitrogen usually sells at a lower price in nitrate of soda than in either of the others, the wisdom of making a large use of this material as a source of nitrogen is apparent."

On a field where potash salts had been applied for 11 years to certain plats the average results were in favor of the potash plats in the case of corn to the extent of 2.7 per cent, but in favor of the no-potash plats in the case of cabbage to the extent of 6.33 per cent. During the previous season potatoes were grown on this field and showed a difference of 36.96 per cent in favor of the potash plats.

The field where a special corn fertilizer was tested produced in 1908 the heaviest crop in its history, 94 bu. of sound corn and 7,760 lbs. of stover per acre being yielded with the special fertilizer as compared with 90.23 bu. of sound corn and 9,224 lbs. of stover with a fertilizer richer in potash. This experiment has continued now 18 years without a single unprofitable crop.

An acre which has grown corn and grass for 19 years, most of the time in alternate periods of two years produced corn at the rate of 90.43 bu. of hard grain and 8,800 lbs. of stover per acre on the portion fertilized with manure alone at the rate of 6 cords per acre, whereas on that portion fertilized at the rate of 4 cords of manure and 160 lbs. of high-grade sulphate of potash per acre, 86.72 bu. of hard corn and 8,280 lbs. of stover per acre were produced. The greater yield produced with manure alone is insufficient to balance the greater cost of this method.

The field used to test different phosphates was planted to cabbages. Drought affected the yield but not the comparative results. The highest yields were obtained from the plats receiving raw bone at the rate of 20,240 lbs., dissolved boneblack, 20,018 lbs., and basic slag meal, 19,120 lbs. per acre, respectively, these being eight times greater than those on the no-phosphate plats.

On a nine-acre field of grass land top-dressed with manure, bone and potash, and wood ashes at the rates of 5,005, 5,345, and 4,624 lbs. per acre, respectively,

the yield was at the rate of 4,977 lbs. per acre. The average yield for the period of 1893 to 1908, inclusive, was 6,220 lbs. per acre. Deficiency in rainfall reduced the yield of rowen in 1908.

In the experiment comparing winter and spring applications of manure the crop was mixed grasses and showed a 10 per cent greater yield of hay and a 14½ per cent greater yield of rowen in the case of the spring application.

Report of the agronomist, A. M. Ten Eyck (*Kansas Sta. Rpt. 1908, pp. XXXI–XXXVIII*).—A general summary of the various lines of work carried on by the department of agronomy of the station is given.

The continuation of fertilizer experiments with wheat and oats shows marked results in favor of the use of barnyard manure. Nitrates and phosphates also gave increased yields especially with wheat. An experiment with alfalfa to determine the relative value of barnyard manure and chemical fertilizers applied to a previous crop on worn land indicated a yield on the land treated with well-rotted barnyard manure, double that obtained from unfertilized plats. Culture methods of destroying bindweed were unsuccessful, but there is indication that success will result from winter plowing and the use of such smother crops as Kafir corn and sorghum.

Report of the cooperative experiment station, McPherson, V. L. Cory (*Kansas Sta. Rpt. 1908, pp. XXIV–XXVIII*).—A general outline of the work with field crops at this station is presented.

Among the various things enumerated it is pointed out that Boswell winter oats, a black variety of English origin, yielded 50.55 bu. per acre and that winter plantings of durum wheat gave an average yield of 18.11 bu. per acre as compared with 6.55 bu. for spring plantings. The highest yield per acre, 37.57 bu., resulted from a fall-sown durum wheat which had been grown as a winter wheat for 3 years. Thirteen varieties of spring barley selected for winter planting gave average yields of 25.12 and 37.13 bu. per acre from fall and spring planting respectively. A test of winter oats gave promising results. Ten varieties of buckwheat, planted at intervals of 1 week beginning with the first Tuesday in April, gave results in favor of the earlier plantings during the 3 years of the test. The average yield for all varieties at the best planting date was 17.14 bu. The best variety averaged 15.5 bu. for all plantings.

First report of the agricultural college farm, Poona, July 15, 1908, J. B. Knight (*Dept. Agr., Bombay, Ann. Rpt. Expt. Work Agr. Col. Sta. [Poona], 1907–8, pp. 5*).—This farm of 145 acres has a great variety of soils ranging from deep black to light calcareous soils. Work has been begun with varieties of jawars, wheats, cottons, turs, and chillies, in each of which local adjustment has been observed, as the seed was introduced from other localities.

Oil-yielding grasses grown at Bandarawela, J. F. Jowitt (*Circs. and Agr. Jour. Roy. Bot. Gard., Ceylon, 4 (1908), No. 14, pp. 109–124*).—This article contains notes on the growing of, and distillation of oil from, citronella grass, lemon grass, and certain other grasses grown on Bandarawela soil.

Report on the results of experiments in 1905 and 1906 on the manuring and inoculation of the bean crop, R. P. Wright (*West of Scot. Agr. Col. Ann. Rpt., 9 (1909), pp. 80–98*).—During 1905, 16 experiments were conducted to determine the value of inoculation, but with contradictory results on each of the types of soil used. During 1906 the inoculation trials were discontinued and the scope of the experiments was altered to include the entire subject of manuring. The results with various fertilizers differed so widely that final conclusions are withheld pending further trials.

The cost of a bushel of corn, W. P. Brooks (*Massachusetts Sta. Rpt. 1908, pt. 1, pp. 12–17*).—The data presented here was derived from the experimental cultivation of an acre of corn for a period of 18 years. It is shown that the

average product has been about 56 bu. and that it has cost about 45 cts. per bushel to produce it.

Corn judging, R. A. Moore (*Wisconsin Sta. Circ. Inform. 8, pp. 16, figs. 10*).—The importance of corn judging as a basis of improvement is stated and a score card prepared with special reference to Wisconsin conditions is presented and fully explained.

Annual report of the Ontario Corn Growers' Association, 1908 (*Ann. Rpt. Ontario Corn Growers' Assoc. 1908, pp. 47, figs. 13*).—This report contains the constitution of the association and a series of addresses and articles of a popular nature on the problems of corn production.

Cotton breeding for farmers, R. J. H. De Loach (*Bul. Univ. Ga. No. 106, pp. 24, figs. 9*).—A popular presentation of the general subject of cotton breeding, with information on diseases and varieties of cotton.

Observations on the effects of storage on cotton seed, H. A. Tempany (*West Indian Bul., 10 (1909), No. 2, pp. 121–124*).—It was observed that after a period of storage, crushed cotton seed gave a bright yellow color when mixed with water, due to rupture and chemical change in the resin cavities in the seed mass. A study of the effects of storage showed that fresh seed had a germination percentage of 51 on February 24, 1908, of 49 on June 3, but of only 8 on April 24, 1909. Substantially the same results were obtained when seed from the same lot was preserved in a desiccator over strong sulphuric acid for the same length of time.

Forty-first annual report of the flax supply association for the improvement of the culture of flax in Ireland, and the dissemination of information relative to the production and supply of flax for the year 1908 (*Ann. Rpt. Flax Supply Assoc. Ireland, 41 (1908), pp. 54*).—Statistical data on the flax and linen industries in Ireland and other countries are given.

Varieties of oats, L. Malpeaux (*Jour. Agr. Prat., n. ser., 18 (1909), No. 40, pp. 467–469*).—Studies in seed selection and in variation in nitrogen content and in difficulty of mastication as related to cellulose content are presented in this article, together with analyses and other data in tabular form for the d'Yvois, de Kirsch, Hvitting, Pluie d'Or, Abondance, Ligowo de l'Ecole, Ligowo II, Probster Blanche, and des Salines varieties. From the standpoint of nitrogen content and yield the best results were obtained with Abondance, Pluie d'Or, d'Yvois, and Probster.

Report on an experiment in 1906 on the effects of planting sprouted seed on the yield of the potato crop, R. P. Wright (*West of Scot. Agr. Col. Ann. Rpt., 9 (1909), pp. 101–114*).—The object of this experiment was to determine the effect upon yield of sprouting potato tubers before planting. The increase varied with the varieties tested, the later varieties showing a decided increase.

Report of the cultivation of potatoes with chemical fertilizers at Penha, P. Cavalcanti (*Lavoura; Bol. Soc. Nac. Agr. [Brazil], 13 (1909), No. 4–6, pp. 102–104*).—In a combined variety and fertilizer test, the best yield was obtained from Aspargo, followed by Rose-native and Lechs.

Annual of the rice culture experiment station (*Ann. Staz. Sper. Risicolt. Vercelli, 1908, pp. 179, pls. 18, figs. 23*).—This publication is a digest of information for the rice producer, in which the status of the industry is outlined. Cuts and descriptions of, and data concerning, varieties of rice are followed by general information on seed selection, manuring, methods of preparation of the soil, planting, cultivation, harvesting, drying, and storing. Statistics of imports and exports are also given.

Tobacco districts and types, J. P. Killebrew (*U. S. Dept. Agr., Bur. Statis. Circ. 18, pp. 16*).—This circular describes briefly the several tobacco districts

of the United States, the types of tobacco grown, and the methods of handling the crops.

Bright tobaccos, F. CHARLAN (*Canada Dept. Agr., Tobacco Dir. Bul. A7, pp. 14*).—This bulletin discusses soils, fertilization, cultivation, curing, and marketing as related to the tobacco industry in southern Virginia and North Carolina.

Tobacco, F. CHARLAN (*Canada Dept. Agr., Tobacco Dir. Buls. A1, pp. 10; A2, pp. 8; A3, pp. 14*).—In the first of these bulletins general information with regard to the setting up of the forcing bed, germination, sowing, weeding, thinning, ventilation, and transplanting of seedlings is given, as well as data as to the diseases and insect pests of the plant. In the second data are presented on the plant food requirements of the tobacco crop and the essential qualities of smoking tobacco, with directions for the proper use of manures to secure a crop of good quality. The third bulletin contains notes on the selection, preparation and manuring of land for tobacco, sowing, setting out, resetting, cultivation, hilling, thinning, topping, suckering, harvesting, and the selection of seed plants, directions for curing, stripping, bulking, tying, and the control of fermentation, and descriptions of the diseases and insect enemies of tobacco.

Investigations concerning seed wheat, C. W. BURKETT (*Kansas Sta. Rpt. 1908, pp. V–XII*).—The text of the state law of 1907, authorizing the importation of seed wheat is given, together with a partial account of the observations of the director of the station during a trip to Turkey and Russia for the purpose of investigating the sources of seed wheat supply and arranging for importations. Brief descriptions are given of the 17 varieties of wheat imported for trial at the station.

The fertilization of wheat, P. LAVALLÉE (*Jour. Agr. Prat., n. ser., 18 (1909), No. 39, pp. 434, 435*).—An account is given of a combination test of varieties of wheat and of superphosphate as a fertilizer on a clay soil.

The varieties tested were Hâtif Inversable, Ble de Noé, Rouge de Bordeaux, Japhet, Précoce d'Avrillé, Bon Fermier, Blanc à Epi Rouge, and Jaune à Barbes. Jaune à Barbes was the latest single variety to ripen but produced the highest yield of both grain and straw. The second in yield was Hâtif Inversable which was also the earliest of all varieties tested. The average yield for all varieties was at the rate of 3,022 kg. per hectare (about 2,690 lbs. per acre). This was 471 kg. per hectare more than was obtained on neighboring farms, and is deemed to justify the application of superphosphate at the rate of 400 kg. per hectare before sowing.

Zapupe: A new type of fiber plant, J. B. DE SANTISTÉBAN (*Zapupe: Nuevo Tipo de Planta Fibrosa. Mexico, 1909, pp. 56, figs. 11*).—The industrial and natural history of the plant are outlined, and *Agave zapupe*, *A. lespinassei*, *A. endlichiana*, *A. aboriginum* n. sp., and *A. deweyana* are described. Notes on the cultivation of the plant and status of the industry are presented and a bibliography appended.

[Wyethia mollis], A. A. HELLER (*Muhlenbergia, 5 (1909), No. 9, pp. 131, 132*).—This plant, locally known as mule ears, is most abundant at altitudes of 6,000 to 8,000 ft., and is important as a forage crop for sheep. Nearly all of the 15 species of the genus are native to the Pacific coast and only *W. mollis* and *W. amplexicaulis* are found in Nevada. *W. lanceolata* is local in the Blue Mountains of Oregon. *W. arizonica* and *W. scabra* are found in the southern Rocky Mountains and *W. amplexicaulis* and *W. helianthoides* in the northern Rocky Mountains and the Great Basin. Seven species are confined to California.

Certain Californian Thalictra, E. L. GREENE (*Muhlenbergia, 5 (1909), No. 9, pp. 128–131*).—*Thalictrum polycarpum* is renamed *T. ametrum* and more fully described. *T. mendocinum*, *T. magarum*, and *T. latiusculum* are described as new.

Notes on some introduced plants of southern California, II, S. B. PARISH (*Muhlenbergia, 5 (1909), No. 9, pp. 121-128*).—It is stated that only one variety of prickly lettuce (*Lactuca scariola* var. *integrata*) has reached the Pacific coast. Notes on the history and distribution of *Taraxacum officinale, Silybum marianum, Xanthium spinosum, Salsola kali tragus, Raphanus raphanistrum, R. sativa, Tribulus terrestris, Medicago lupulina, Melilotus alba, Plantago lanceolata, Daucus carota*, and *Datura tatula* are also given.

Dodder v. alfalfa, E. M. WILCOX (*Insect Pest and Plant Disease Bur. Nebr., Div. Bot. Circ. 3, pp. 3, figs. 4*).—This circular presents a popular discussion of dodder as a parasite, its introduction, detection, and removal from seeds, and its eradication from alfalfa fields.

[The effects of chemicals and proprietary preparations on vegetation and weeds], G. E. STONE (*Massachusetts Sta. Rpt. 1908, pt. 1, pp. 62-72, pl. 1*).—In general in these experiments a solution of 1 part of the chemical employed to 20 parts of water or 4 lbs. to 10 gal. was applied at the rate of 10 gal. per square rod.

Carbolic acid killed vegetation more quickly than any other substance, but the treatment was not perceptible 2 months later. Fifty per cent mixtures of benzin and gasoline in water produced similar results, while a 50 per cent mixture of kerosene had little effect. Sodium arsenite killed all plants but new grass appeared, and lead acetate only slightly burned the grass and plantain. White arsenic and sal soda 1 : 2 proved very effective but when used in a solution of 1 part to 66 parts of water new grass appeared within 2 months after the application, although all vegetation was killed when the solution was applied. Salt and Paris green, while killing some plants, produced no permanent effect. Corrosive sublimate destroyed vegetation effectively but not permanently. Equal parts of arsenate of soda and corrosive sublimate killed all plants with permanent effect. Nitrate of soda proved of little value in this connection and sodium sulphid and niter cake gave a similar result. Arsenate of soda and corrosive sublimate (1 : 1) permanently killed all vegetation. White arsenic was very effective and arsenic sulphid dissolved in an alkaline solution of potassium sulphid was also very destructive to plant life.

The results of the different experiments indicate that, as a rule, soil treated with a mixture of 2 lbs. of arsenic compounds and 10 gal. of water at the rate of 10 gal. per square rod will remain free from weeds for a number of years. It is stated that a few applications will kill poison ivy, but it is recommended that the solution be not used on small trees and be kept away from the feeding roots of all valuable trees. Notes are given on other methods of killing weeds and on the use of different preparations for this purpose.

Garden and field seeds sold in Connecticut in 1908-9, E. H. JENKINS and MARY G. JAGGER (*Connecticut State Sta. Bul. 164, pp. 3-26*).—This bulletin gives directions for sampling and submitting seeds for test, and presents in tabular form studies of the purity, germination, and viability percentages of samples of the seed of red, mammoth, alsike, white, and crimson clovers, alfalfa, redtop, timothy, Kentucky blue grass, and Hungarian millet, and of the germination percentage and weight per hundred seeds of samples of lettuce, radish, cabbage, onion, muskmelon, and watermelon seed.

[Notes on seeds, screenings, and weeds in Massachusetts], P. H. SMITH, G. H. CHAPMAN, and G. E. STONE (*Massachusetts Sta. Rpt. 1908, pt. 1, pp. 29-42*).—Notes on the value of screenings as a feeding stuff and on the objections to their use are given together with descriptions of 14 weed seeds most common in grass seed and cattle foods, and a brief historical sketch of weeds in the State.

The results of separating parsnip, lettuce, celery, and onion seeds into different grades are briefly reported and point out the superiority of the heavy over the light seed. Every sample of onion seed examined for the purpose contained numerous rust and smut spores.

Seed work, G. E. STONE (*Massachusetts Sta. Rpt. 1908, pt. 2, pp. 54–58*).—The seed work of the station is briefly described. During the year more samples of seed for germination tests were received than in any preceding season, the excess over 1907 in seeds separated being 898 lbs. The mode of separation of small seeds has been previously described (E. S. R., 19, p. 1036). The average germination percentages for each of the principal kinds of seeds tested were as follows: Onion 74.2, tobacco 78.2, celery 79, corn 87.9, lettuce 99, and pansy 86.9. Twelve purity tests of clover, alfalfa, and mixed grass seeds showed the presence of 0.6 to 14.7 per cent of impurities, largely noxious weed seeds.

The seed control act, H. L. BOLLEY (*North Dakota Sta. Spec. Seed Bul. 1, pp. 3–15, fig. 1*).—This bulletin contains the text of the state pure seed law, with notes and comments on the same.

The Wisconsin seed inspection law, A. L. STONE (*Wisconsin Sta. Circ. Inform. 4, pp. 10*).—The text of the state seed inspection law is given, together with the standards of purity and germination established, and general information as to impurities, adulteration, misbranding, and testing of seeds under this law.

HORTICULTURE.

Report of the horticulturist, M. J. IORNS (*Porto Rico Sta. Rpt. 1908, pp. 17–22, pl. 1*).—The horticultural work was continued largely along the lines previously reported (E. S. R., 20, p. 38).

The cooperative fertilizer experiments with citrus fruit growers are already giving some tentative results. Complete fertilizers again seemed markedly superior to those made up of 1 or 2 elements. Nitrogen, derived from dried blood, and potash from potassium chlorid, gave the greatest amount of vegetative growth. In bearing groves the legumes, when plowed under, appear to supply the greater part of the necessary nitrogen. The quality of the fruit seems to be materially affected by the source and relative proportion of different food elements, organic fertilizers giving a coarser fiber and skin, and unbalanced combinations giving poorly flavored and insipid fruits. The amounts of fertilizer and time of fertilizing appear to affect the time of fruiting.

The work of experimenting with fertilizers, cover crops, and culture in the orchards was considerably enlarged. In order to have true standards for comparison, a new grove was planted with the more general named varieties of the various citrus fruits. A comparative test of stocks will also be made, the trees being budded on the sour orange, the rough lemon, *Citrus trifoliata*, native seedlings, and other stocks. In the orchard of miscellaneous and introduced fruits, *Averrhoa carambola*, *Lucuma rivicoa angustifolia*, several of the new Anonas, *Triphasia monophylla*, *Myrtus tomentosos*, and *Spondias axillaris*, produced some fruit during the year. Twenty improved mangoes from different countries have been added to the station's collection. Native mango trees of from 1 to 4 or more inches in diameter can be transplanted with little loss when the work is done in the rainy season, the roots being well balled with earth and the tops cut back severely. Some 30 species of eucalypts are on trial, largely with a view of finding some quick growing valuable tree for barren hilltops and other waste lands.

The fruiting season of roselle appears to be affected by the time of planting. When set out from January to May, the plants began to bear very young,

successive crops being formed on new growth until June or July when the fruit was kept picked. Fruit bearing then ceased until the latter part of October when the main crop was borne, after which the plant usually died. With plantings made from May to August no fruit was borne until the main crop was produced in October and November. The grapes in the station vineyards continue to make exceptional growth, the tendency being to produce vegetative growth at the expense of fruit. Three varieties have been forced into bearing by 2 heavy prunings, one in spring and the other in the early fall, together with frequent bud pinching. Other varieties have not been benefited by this practice and in some cases the effect seems to be negative.

The work of acclimatizing, selecting, and breeding various vegetables was continued. Grafting eggplant was found to be not only practicable but advisable, especially for home use. The best stock for this purpose is the Berengena cimarrona, which is found in almost every part of the island. The "susumber," which is used in Jamaica as a stock for eggplant, has not thus far proved very successful in Porto Rico. A strain of cucumbers of the White Spine type has been developed that is much more resistant to disease than the ordinary form, and bears heavy crops of extra fine fruit. A strain of peanuts developed by selection is reported as having an extra fine large sweet nut, and as yielding at the rate of over 90 bu. per acre in the trial planting. Three strains of cowpeas have been developed, one of which has a pod of a dark purplish color when ripe. It made good growth and matured good crops of seed when all other varieties tried nearly failed. Several varieties of cowpeas and sword beans, procured from Venezuela and some of the islands of the West Indies, are being acclimatized. The strain of "melón de China," previously noted, has been further developed by cross breeding with the Rockyford melon. Tests of the cross thus far reported are very favorable. Trial plantings were made of a large number of Blinn's best resistant strains of muskmelon (E. S. R., 19, p. 944), but the results as to disease resistance were almost without exception negative. Native resistant types have also failed during periods of intense disease ravages.

In the work of propagating and distributing various fruits, it was found that the breadfruit tree can be quite successfully propagated from a modified form of root cutting. The soil is removed from the base of the parent plant and the larger roots are exposed for a distance of several feet. These are severed about 2 ft. away from the tree and the ends left exposed. In a short time new plants start from each cut end which can be transplanted when well rooted.

The results of pineapple experiments and observations have been previously noted (E. S. R., 21, p. 45). It has been found that the Red Spanish variety does not adapt itself well to the heavy soils, while the Cabezona seems to prefer such soils, provided they are well drained. Some of the sandy soils appear to be too fine grained for good drainage, and are not considered suitable for pines. The work of breeding a variety of spineless pine by selection gives some promise of success.

Report of the horticulturist, A. Dickens (*Kansas Sta. Rpt. 1908, pp. LIII–LV*).—Lime-sulphur wash used on peach trees as a preventive of scale also proved effective in combating the peach louse, leaf curl, and brown rot. The trees were sprayed in March and observations made in May. It was found that the late varieties suffered a heavier loss from rot than earlier ones, thus indicating the need of a later spray.

Work in protecting peach trees from frost during and immediately after the blooming period, indicates that when the wind velocity is below 7 to 8 miles an hour, pots of crude oil placed at the rate of 100 per acre, will afford protection down to 22° F. One gallon of crude oil burned in an open pot lasted nearly 4

hours. In the general observations relative to frost injury, the value of good air drainage was apparent, poorly drained sections both in the vineyard and in the apple orchard having suffered quite seriously.

In the fertilizer tests on potatoes and other vegetables, peas, beans, tomatoes, potatoes, and sweet corn have not paid for special fertilizers, whereas these proved to be valuable with onions, celery, and lettuce. The forest tree nursery work is giving promising results.

[Horticultural work at the Fort Hays Substation], C. K. McClelland (*Kansas Sta. Rpt. 1908, pp. XVIII, XIX*).—A brief statement of horticultural investigations under way, together with some data on plantings of fruit and forest trees.

The South African pipe calabash, D. Fairchild and G. N. Collins (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 41, pp. 9, pls. 2*).—Seeds of this gourd (*Lagenaria vulgaris*) have been introduced from South Africa, and the plants appear to thrive in all parts of the United States. The necks of the fruit are extensively used as tobacco pipes. Instructions are given herein for growing and shaping the gourd, together with directions for the home manufacture of pipes. The raising of these gourds on a large scale in the expectation of a commercial demand is, however, not deemed advisable.

The cardoon in Chieri, G. Chiej-Gamacchio (*Ann. R. Accad. Agr. Torino, 51 (1908), pp. 47–62*).—Methods of growing the cardoon (*Cynara cardunculus*) in the vicinity of Chieri are described, and data are given on the cost of the various cultural operations, together with notes on the insect pests of this plant.

The influence of environment on the composition of sweet corn, 1905–1908, M. N. Straughn and C. G. Church (*U. S. Dept. Agr., Bur. Chem. Bul. 127, pp. 69, figs. 11*).—These studies were conducted jointly by the Bureau of Chemistry and the Bureau of Plant Industry of this Department in cooperation with the experiment stations of Florida, South Carolina, Maryland, Connecticut, New Jersey, and Maine. The results on breeding for increased sugar content and the adaptation of varieties are to be interpreted by the Bureau of Plant Industry. The work here reported has to do with a study of such factors of environment as length of day with its concomitants, the amount and distribution of sunshine, the altitude, the temperature and the amount and distribution of rainfall in respect to their influence on the sugar content of sweet Indian corn. Two varieties of sweet corn, the Stowell Evergreen and the Crosby, were grown at all of the stations mentioned except the Maine Station, where the Crosby alone was grown. The work was conducted at the New Jersey Station for only 1 season, and at the Florida Station for only 3 seasons.

The general plan pursued was similar to that followed in former studies with sugar beets (E. S. R., 17, p. 549). In addition to the chemical determinations as to sweetness and general character of the corn both in its table stage and after maturing, organoleptic tests were made throughout the studies. The details of the work, together with the data secured each year at the various stations are reported and discussed, the general effect of environment being illustrated by graphic charts. The work for the 4 seasons is then summarized as a whole and discussed. In the following tables the Maine figures for 1907 are not given because the corn did not reach the edible stage before the first frost.

Summary of analytical data for four stations, 1905–1908.

CROSBY VARIETY.

Station.	Average sugar content, edible condition.				Average moisture.				Average sugar content calculated to water-free basis.			
	1905.	1906.	1907.	1908.	1905.	1906.	1907.	1908.	1905.	1906.	1907.	1908.
	Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
Florida	......	5.01	5.57	4.99	....	67.11	72.11	67.89	....	15.64	20.89	15.71
South Carolina	12.22	4.73	7.25	5.19	65.84	76.77	71.27	76.72	36.05	20.64	28.98	23.17
Maryland	......	5.01	5.40	......	....	69.79	75.14	....	....	17.46	22.72	......
Connecticut	7.73	4.23	4.83	4.76	73.01	65.26	71.19	70.12	30.44	12.46	17.19	16.58
Maine	6.50	5.66	......	1.66	79.30	71.88	....	73.72	32.76	20.94	......	18.17

STOWELL EVERGREEN VARIETY.

Station.	Average sugar content, edible condition.				Average moisture.				Average sugar content calculated to water-free basis.			
	1905.	1906.	1907.	1908.	1905.	1906.	1907.	1908.	1905.	1906.	1907.	1908.
Florida	......	4.07	5.43	4.59	....	70.27	77.08	76.24	....	13.91	24.25	20.03
South Carolina	6.68	4.99	4.95	1.41	75.54	71.72	76.82	75.50	27.95	18.07	22.05	18.43
Maryland	5.78	3.77	4.83	5.20	78.13	72.34	80.59	77.92	27.18	13.61	24.97	24.02
New Jersey	4.26	......	......	......	69.28	....	....	....	14.12	....	....	......
Connecticut	5.36	3.92	3.69	2.92	74.62	73.38	78.20	70.91	21.70	15.10	17.11	10.12

Summary of analytical and meteorological data, 1905–1908.

[Data averaged for month of planting to month of harvesting, inclusive.]

Station.	Total sugars.[a]	Mean temperature.	Precipitation.	Clear days.	Sunshine.
Florida:	*Per cent.*	°*F.*	*Inches.*		*Per cent.*
1906	....	71.0	22.66	34	62.0
1907	....	74.0	11.66	72	71.2
1908	....	75.0	12.55	66	74.0
Average	18.41	73.3	15.62	57	69.1
South Carolina:					
1905	....	72.7	19.80	80	61.0
1906	....	71.6	28.07	67	66.0
1907	....	68.7	13.59	81	65.2
1908	....	71.2	19.23	73	61.0
Average	24.42	71.0	20.17	75	61.8
Maryland:					
1905	....	68.0	24.49	104	52.0
1906	....	68.4	28.88	50	53.0
1907	....	63.4	16.95	58	56.6
1908	....	70.7	11.92	63	63.0
Average	21.66	67.6	20.56	69	56.1
New Jersey:					
1905	14.12	68.0	16.91	87	61.0
Connecticut:					
1905	....	66.2	17.11	45	60.0
1906	....	67.8	21.46	56	55.0
1907	....	64.6	17.58	60	57.2
1908	....	67.8	20.30	71	74.0
Average	17.59	66.6	19.11	58	61.5
Maine:					
1905	....	62.7	10.64	45	....
1906	....	65.0	8.53	53	....
1908	....	66.1	9.70	66	....
Average	23.96	64.6	9.62	55	....

[a] Average of Crosby and Stowell Evergreen corn calculated to water-free basis.

The general conclusions drawn from this work as presented by H. W. Wiley are in substance as follows: The content of sugar in sweet corn does not depend so much on temperature and length of day as in the case of the sugar beet. The amount and distribution of rainfall appears to be the most important factor affecting the edible quality of green Indian corn, a moderate and well-distributed rainfall, especially during the growing season, being necessary to produce a crop having the best qualities. As reported earlier in the investigations by the Maryland Station (E. S. R., 19, p. 840), the sugar content of sweet corn rapidly diminishes after the ear is separated from the stalk. Under ordinary conditions of storage the speed of diminution is more rapid with a higher and slower with a lower temperature. The disappearance of the sugar is attributed to the continued growth of the grains of the ear and the transformation of the sugar into starch or some other form of nonsaccharine carbohydrate. A higher average sugar content was found in the corn grown in South Carolina and in Florida than that grown in Connecticut and in Maine, but the chief difference between the sweet corn of the extreme North and the extreme South is found not so much in its sugar content as in its succulence, the lower temperatures of the North making the corn more tender and edible for a longer period than the extremely high temperatures of the South. The superiority in sugar content of the southern corn suggests the possibility of acclimating the most favorable varieties, and by selection and careful cultivating greatly improving the southern grown product. The data secured from the work as a whole indicate that curves showing variations in temperature, latitude and altitude, the amount of sunshine, and the quantity and distribution of the rainfall can not be so readily compared with the lines showing the sugar content as in the case of the sugar beet.

Manganese in some of its relations to the growth of pineapples, W. P. Kelley (*Jour. Indus. and Engin. Chem., 1 (1909), No. 8, pp. 533–538; abs. in Jour. Soc. Chem. Indus., 28 (1909), No. 17, pp. 948, 949; Chem. Abs., 3 (1909), No. 21, p. 2605*).—This has been noted from another source (E. S. R., 21, p. 139).

Climatology and soil and their influence on fruits, T. H. McHatton (*Ga. Bd. Ent. Bul. 27, pp. 47–52*).—A brief general discussion of this subject in relation particularly to the more important Georgia fruits, including the peach, plum, apple, pear, and grape.

[Experiments in orchard heating], J. L. Hamilton et al. (*Ann. Rpt. Bd. Hort. Colo., 1909, pp. 41–56*).—Accounts are given of the experience of different Grand Junction fruit growers in the use of orchard heaters for protecting the crops against frost.

The history and relationship of the citron (Citrus medica), E. Ferrari (*Atti R. Ist. Incoragg. Napoli, 6. ser., 7 (1909), pp. 21*).—A study of the citron, in which consideration is given to its natural and cultural range, its history, and its botanical, biological, and chemical relationships with other citrus fruits. A bibliography of the literature consulted is included.

Fig culture, A. C. Van Velzer (*Houston, Tex., 1909, pp. 218, pls. 2, figs. 52, dgms. 3*).—This work is offered as a statement of the history, variety, and botany of the fig in Asia, Africa, and America, and a special treatise of its propagation, cultivation, and curing in North America. It combines information gained from field investigations by the author with that gained from prevous literature on the subject. The preface contains an extensive bibliography for collateral reading.

Report of the government viticultural expert for the year 1903, R. Dubois (*Cape Good Hope Dept. Agr., Rpt. Govt. Vit. Expert, 1903, pp. 23*).—In this report the author outlines the various branches of work which the viticultural branch of the Cape of Good Hope Department of Agriculture planned to take

up for the development of the grape and wine industries. An appendix contains the report of C. Mayer, agricultural assistant, on the work in connection with viticulture during the season of 1903.

Report of the government viticultural expert for the half-year ended June 30, 1904, R. DUBOIS ET AL. (*Cape Good Hope Dept. Agr., Rpt. Govt. Vit. Expert, 1904, June 30, pp. 23*).—This report includes summary reports from those in charge of different sections of the viticultural work, together with a survey of the general work of the viticultural branch, which is discussed under the following heads: Organization of the branch, educational work, and inspection work. Advice and recommendations regarding questions pertaining to the grape and wine industry are also included.

The outlook for apple growing in the Ozarks, E. WALKER (*Proc. Ark. State Hort. Soc. 1909, pp. 102–117, figs. 4*).—A paper on this subject in which the author outlines the present status of apple growing in the Ozark region, and makes an appeal for more thorough orchard management, suggestions being given relative to methods of cultivation, pruning, spraying, packing, and marketing.

The influence of stock on scion in the graftage of plums, F. A. WAUGH (*Massachusetts Sta. Rpt. 1908, pt. 2, pp. 174–182, figs. 4*).—In 1899 the author began a series of experiments in cross-grafting plums at the Vermont Station, in which the Milton and several other varieties were grafted on the Americana, Wayland, Marianna, and peach stocks. The results secured in this work from 1900 to 1905 have been noted (E. S. R., 17, p. 1069), and comparative notes based on a large number of measurements of the trees made by C. S. Pomeroy in 1908 are here reported, showing the growth behavior of the Milton variety on the various stocks. The other cross-grafted varieties are said to have shown substantially the same modifications. The characters specially reported on include the form and size of the leaf, marginal serrations, and rate of growth. Variations along these lines are illustrated by tabular data and graphic curves, and discussed.

The conclusion is reached that distinct modifications do occur in plum trees due to the influence of the stocks in which they are grafted, these influences appearing to extend to all characters of leaf, twig, habit of growth, etc. Similar observations have not as yet been made for the fruit. In the experiments reported, the Marianna stock in particular seems to produce the most obvious changes in the growth of scions, these changes being evidenced in broader leaves, finer marginal serrations, greater annual growth, larger internodes, greater diameter of branches, and greater variability in all characters.

On the treatment of trees which are barren as a result of too deep planting, C. JOHN (*Deut. Obstbau Ztg., 1909, No. 31, pp. 469–478, figs. 11*).—The author points out that one of the principal causes of unfruitfulness and of the sickly condition of many fruit trees is too deep planting of the trees. In his own experience, trees thus planted, and which failed to bear fruit, have been brought into abundant fruitfulness by removing the strong adventitious roots which have formed on the upper part of the root collar or about the base of the stem. His method of procedure is described.

How to preserve ripe fruits for exhibition purposes (*Rogue River Fruit Grower, 1 (1909), No. 7, pp. 12, 13*).—This consists of general directions for preserving specimen fruits, together with the formulas used by the U. S. Department of Agriculture and a formula used in California, as well as a list of fruits and of the preservatives to be used in each case.

Report of the coffee expert, J. W. VAN LEENHOFF (*Porto Rico Sta. Rpt. 1908, pp. 33, 34*).—The yield of the coffee crop as a whole was unfavorably influenced

by weather conditions prevailing during the year. The bananas planted as provisional wind-breaks proved to be efficient protection for the young coffee during the strong winds in the beginning of 1908, and also seemed to have greatly benefited the growth of the young permanent wind-breaks planted between the rows. Considerable damage by weevils is reported, especially at altitudes of 2,000 ft. above sea level and over, and mainly in the young coffee. Borers have done considerable harm to the guava shade trees in several districts. The coffee leaf miners, although abundant everywhere, appear to be held in check by their parasite.

The experiments in improving an old coffee grove and in establishing a new grove (E. S. R., 20, p. 45) were continued. The yield from the renovated grove was only 2,472 lbs. in 1907 as compared with 4,349 lbs. in 1906. The average total cost of gathering and preparing 100 lbs. of coffee ready for market was $5.275, and the average price obtained $11.23. The total expense per acre for the fourth year in the new 3-acre planting was $12.44, and the yield 214 lbs. of coffee. The net cost per acre of this planting for the 4-year period has been $91.56. The foreign coffees being tested are reported as doing well.

A new large walnut (*Pacific Rural Press, 78 (1909), No. 23, p. 357, figs. 4*).—A description, with illustrations of the tree and nut, is given of a new and promising English walnut, the Willson Wonder, originated by F. C. Willson in California. The original tree of this variety is 8 years old and has borne heavily since its second year. It is stated that the nuts are large in size, with a thin shell, and a light-colored, rich, sweet kernel.

Lavender plantations, L. LAMOTHE (*Lavende et Spic. Le Grand-Serre, 1908, 2. ed., pp. 42*).—This work, which is published with a view of stimulating the plantation culture of lavender in the mountains of France, contains information relative to varieties, culture and fertilization, production, distillation, uses, markets, and imitations.

FORESTRY.

How to grow and plant conifers in the Northeastern States, C. R. PETTIS (*U. S. Dept. Agr., Forest Serv. Bul. 76, pp. 36, pls. 5, dgms. 4*).—The instructions contained in this bulletin are based upon 7 years of nursery and planting operations at the New York State nurseries in the Adirondacks, and upon studies of planting in New England. It is believed that the methods devised may be applied generally in the Northeastern States.

The important phases discussed include procuring the seed, either by purchase or collection, curing, drying and storing seeds of various species, establishing a forest by planting trees, including nursery practice, transplanting, and planting operations, data on the cost of this work, and the establishment of a forest by seeding where the forest is to grow, under which is discussed broadcast sowing and partial seeding by the strip method and seed spots.

An appendix contains planting and seed tables, etc.

Report of state forester, A. F. HAWES (*Ann. Rpt. Comr. Agr. Vt., 1 (1909), pp. 173–182, dgm. 1*).—This report deals largely with data on forest planting operations in Vermont during 1909. There were sold to different landowners 195,500 forest seedlings, mostly white pine, but including Scotch pine, red pine, Norway spruce, and locust. The forester is prepared to furnish the schools of the State with trees for Arbor Day planting and directions are given for the establishment of small nurseries by schools. At the date of this report the state nursery had on hand 707,800 trees.

Forest laws of California and rules for the prevention of forest fires (*Sacramento, Cal., 1909, pp. 22*).—This is issued by the state board of forestry.

Report on rubber-yielding plants of French Guinea, A. CHEVALIER (*Bul. Off. Colon.* [*France*], *2* (*1909*), *No. 18, pp. 545–557*).—A brief report on the present status of wild rubber exploitation and on the artificial plantings being developed in French Guinea, including information relative to the rubber-yielding species, methods of harvesting and coagulating the latex, and the preparation of rubber for the trade. The author concludes that the rubber-yielding species of East Africa are too dissimilar to make possible the unification of the various grades of rubber produced.

Rubber production on the Ivory Coast (*Bul. Off. Colon.* [*France*], *2* (*1909*), *No. 19, pp. 577–590*).—A report on this subject, discussing the extent of production, rubber-yielding species, harvesting, and methods of coagulating the latex, commercial grades of rubber, and market conditions.

Rubber and gutta-percha in New Guinea, WARBURG (*Verhandl. Kolon. Wirtschaftl. Kom., 1909, No. 2, pp. 34–44*).—A brief report on the present status of the rubber industry in the German colonies, with special reference to New Guinea.

Wood preservation in the United States, W. F. SHERFESEE (*U. S. Dept. Agr., Forest Serv. Bul. 78, pp. 31, pls. 4, figs. 3*).—The purpose of this bulletin is to discuss briefly but completely the general principles of wood preservation and its status in the United States to-day. General consideration is given to the nature of decay, methods of retarding it, and the preservatives and processes in use. These processes are then discussed in detail, including the various pressure and nonpressure processes, the low-pressure process, and superficial treatments, such as the brush method and dipping. The effect of treatment on the strength of timber, and the national value of wood preservation are also considered.

The estimated total annual destruction of cut timber in the United States is given at 9,667,340 M ft., b. m. The estimated reduction in annual cut which would ensue from a proper preservative treatment of all timber from decay is given as 5,950,195 M ft., b. m. The estimated annual financial saving by proper preservative treatment is $71,780,000.

Forest products of the United States, 1908 (*Bur. of the Census* [*U. S.*], *Forest Products 10, pp. 137, dgms. 2*).—This bulletin contains statistical data compiled by the Bureau of the Census in cooperation with the Forest Service of this Department relative to the production of lumber, lath, and shingles, the cross-ties purchased, the consumption of pulp wood, tan bark and tanning extracts, the production of slack and tight cooperage stock, number of poles purchased, wood consumed in veneer manufacture, wood distillation, pine distillation, and exports of forest products in 1908.

The total value of forest products of the United States in 1908 was estimated to have been $1,050,000,000, a decrease of nearly 18 per cent from the value in 1907. This decrease is attributed chiefly to the business depression.

Foreign trade of the United States in forest products, 1851–1908 (*U. S. Dept. Agr., Bur. Statis. Bul. 51, pp. 32*).—This consists of a compilation of the statistics of the imports and exports of forest products in the foreign trade of the United States for the period 1851–1908, the data being secured from reports of the Bureau of Statistics, Department of Commerce and Labor. The value of domestic forest products exported from the United States increased from an annual average of $6,000,000 in 1851–1855 to $59,000,000 in 1901–1905. The increase in the value of forest products imported for the corresponding periods was from $2,000,000 to $72,000,000. The highest values given are for 1907, when $92,948,705 worth of forest products was exported, and $122,420,776 worth was imported.

DISEASES OF PLANTS.

Report of the plant pathologist and superintendent of southern California stations, July 1, 1906, to June 30, 1909, R. E. SMITH (*California Sta. Bul. 203, pp. 5–63, figs. 23*).—An account is given of the pathological work of the stations and particularly of the investigations which have been carried on in connection with the southern California stations at Whittier, Riverside, and Santa Monica. After describing the establishment of the new laboratories, the author gives accounts of some of the investigations, which include studies of pear blight, walnut blight, lemon rot, sugar-beet blight, peach blight, rose diseases, apricot diseases, olive knot, onion mildew, brown rot of stone fruits, celery blight, apple mildew, and tomato diseases.

In connection with the pear blight work, which is carried on in cooperation with this Department, the author thinks that sufficient work has been done to demonstrate the method of combating the disease and that further work on as large a scale as the past few years would not be profitable. In these investigations some peculiarities of the pear blight in California have been brought to light. Among these are the large amount of infection that takes place through the twigs and green shoots, and the number of trees which become infected in the body near the ground or just under the ground. Insects seem to play an important part in infecting these portions of the trees, and the point of attack on the lower part of the trunk seems to be the buds or young sprouts. As some of the stocks used for growing Bartlett pears tend to send up root shoots, it is suggested that other stock should be employed that has little or no tendency to low branching or the sending up of suckers.

Investigations with walnut blight have shown the presence of immune varieties, and the author believes that the solution of the problem of walnut culture will be the use of immune varieties grafted upon resistant stocks.

In the investigation of the apricot disease the author reports that much of the trouble has been caused by the fungus *Coryneum beyerinkii*. This fungus not only attacks the foliage but destroys many of the fruit buds. In addition, a physiological effect somewhat resembling that produced by the fungus is described. From experiments in spraying peaches it is believed that the Coryneum disease may be controlled by one spraying of Bordeaux mixture in November followed by a second in February.

Investigations are being continued on the olive knot, a previous account of which has been given (E. S. R., 10, p. 55). These investigations are being conducted to learn the source and method of infection.

In cooperation with the Orange County Celery Growers' Association successful experiments have been carried on for the control of the celery blight, caused by *Septoria petroselini apii*. This fungus in 1908 caused very serious losses, but as a result of general spraying the disease was practically controlled during the season of 1908–9.

The report concludes with a list of diseases of plants that have been observed since the last report.

[Notes on plant diseases], G. E. STONE (*Massachusetts Sta. Rpt. 1908, pt. 1, pp. 43, 44, 46–61, pl. 1*).—Notes are given on bacterial rot of the cabbage and cauliflower, crown gall, onion rot, onion smut, a disease of the radish, celery crown rot, and a disease of lettuce due to nematodes and methods of control. These different diseases are discussed in a popular manner and suggestions given for their prevention.

In connection with the treatment for onion smut, the author devised a simple and inexpensive appliance for attachment to the onion drill, by which the seed can be moistened with formalin at the time of planting. It was found that if

the seed and the soil about it for a space of an inch or so was moistened with dilute formalin the onion smut would be prevented to a considerable extent.

The disease of radishes described is apparently a new one and is attributed to *Ascochyta* sp. It was observed in a number of instances and in some cases caused considerable injury to the seedlings. Experiments were carried on to determine the effect of sterilization of the soil, and this proved an efficient remedy.

The celery crown rot, which is said to have been quite destructive in some localities, is of a bacterial nature, but the symptoms of the disease do not coincide with those of any previously described. A study is being made of the trouble, both in the laboratory and in the field.

The presence of nematodes in greenhouse-grown lettuce is reported, this being the only instance where this crop was observed to be affected in this manner for about 10 years, although the greenhouse then infested has been used for growing lettuce and cucumbers during this time. In investigations which have been carried on for some time, the author found that subirrigation was quite efficient in controlling the nematodes in the case of cucumbers, no galls being noticed on the roots where the plants were subirrigated, while those that were top-watered were in all cases severely infected. It is thought that probably the application of excessive amounts of water for brief periods may prove a practical method of ridding the soil of this pest. On account of the popular belief that lime exerts an influence on nematodes, the author has investigated the subject and finds that lime has little or no effect upon them. Summarizing the various methods which have been suggested for destroying nematodes, the author recommends sterilization of the soil, hard freezing, thorough drying, the use of abundant water, as described above, and trapping, or the catch-crop method, which has been found successful in Germany.

Report of the botanist, G. E. Stone (*Massachusetts Sta. Rpt. 1908, pt. 2, pp. 52–54*).—A synopsis is given of investigations carried on under the author's directions during the period covered by the report, including studies of a large number of plant diseases. The season is said to have been unusually dry and on this account many of the more common fungus diseases were not as abundant as usual.

Report of the plant pathologist, G. L. Fawcett (*Porto Rico Sta. Rpt. 1908, pp. 35, 36*).—A report is given on a preliminary survey of the diseases of citrus fruits, pineapples, and sugar cane prior to beginning laboratory and field experiments as to their causes and means of prevention.

Relation between the weather and the occurrence of plant diseases, K. Störmer (*Landw. Wchnschr. Sachsen, 11 (1909), Nos. 20, pp. 202, 203; 21, pp. 210–212*).—A discussion is given of the relation of temperature, rainfall, soil moisture, etc., to the prevalence of disease in various crops.

The disposition and immunity of agricultural crops toward parasitic fungi, E. Henning (*K. Landtbr. Akad. Handl. och Tidskr., 48 (1909), No. 3, pp. 172–211*).—A general résumé of our present knowledge of the subject.

The author concludes that barberry shrubs should be dug up and destroyed, this being especially important in the case of shrubs in the vicinity of grain fields. Borders of wild grasses between and around grain fields should be cut often, so as not to form centers of contagion by spreading uredospores to the small grains.

The hot-water treatment for seed grain at creameries, F. K. Ravn and O. Elberg (*Landmandsblade, 42 (1909), Nos. 14, pp. 181–186; 15, pp. 193–196*).—The paper describes an arrangement made at Danish creameries for treating seed grain according to the hot-water method, the work being done by the regular creamery help.

On smut of wheat, barley, and oats, J. ERIKSSON (*K. Landtbr. Akad. Handl. och Tidskr., 47 (1908), No. 4, pp. 274-285, figs. 6*).—Brief illustrated descriptions of the different kinds of smuts are given, with preventive measures.

On barley smut and methods for its eradication, H. TEDIN (*Sveriges Utsädesför. Tidskr., 19 (1909), No. 2, pp. 119-130*).—The author recommends the hot-water treatment as a reliable method for eradicating loose barley smut.

Trials with the hot-water treatment for six-rowed barley, 1908, M. L. MORTENSEN (*Tidsskr. Landbr. Planteavl, 16 (1909), No. 1, pp. 110-119*).—Experiments were conducted on 6 different farms with six-rowed barley treated by the hot-water method for *Pleospora graminea*.

There was an average increase of about 10 per cent in the yield of grain and 8 per cent in the yield of straw. The best method of treatment was found to be dipping the grain without previous treatment 20 times in the course of 5 minutes in water heated to 56–57° C., and immediately spreading it in a thin layer on a clean floor to cool. Since about 1 per cent of seed will be likely to remain diseased after this treatment, it is recommended that treating the seed grain every year be continued.

Preliminary note on a serious stem disease of alfalfa (*Agr. Jour. Cape Good Hope, 35 (1909), No. 4, pp. 393–396*).—An account is given of a disease of alfalfa that has been found in a number of parts of Cape Colony. The trouble is due to *Tylenchus dipsaci*, a stem-infesting nematode known to occur as a pest in Europe on rye, oats, onions, hemp, potatoes, clover, alfalfa, and other plants. The nematodes cause characteristic distortions of the stems, and the discoloration of the plants serves to indicate their presence.

It seems to be pretty well established that the disease was introduced into South Africa from Europe in seed, and attention is called to the possibility of disseminating the disease through the sowing of infected seed.

The present report, which is regarded as preliminary, is to be followed by a more detailed study.

The club root disease, F. K. RAVN (*Tidsskr. Landbr. Planteavl, 15 (1908), No. 4, pp. 527–620, maps 4*).—This is a report on the history of the club root disease, its method of distribution and conditions of contagion, the appearance of the disease in Denmark and methods of combating it. An extended bibliography is given at the end of the paper.

Black rot of ginseng roots, W. H. RANKIN (*Spec. Crops, n. ser., 8 (1909), No. 87, pp. 208–210, figs. 3*).—The black rot of ginseng, due to *Rhizoctonia* sp., is described and some observations are given on the fungus causing it. The diseased roots when dug are said to be coal black in color, devoid of fibers, and covered with peculiar protuberances.

The fungus, which is sterile, has been studied to some extent, and the author states that a peculiar thing about the disease is that its period of attack on the roots is in the winter, during the cold weather. At a temperature of 40° F. the fungus grew luxuriantly and produced sclerotia in plate cultures.

An attempt was made to determine some means of control, but it was found that the fungus grew equally well on an acid or alkaline medium. It is, therefore, probable that soil treatments, such as changing the acidity or alkalinity of the soil, would not be of any value.

Observations on potato canker, H. JÖSTING (*Deut. Landw. Presse, 36 (1909), No. 68, pp. 725, 726, figs. 5*).—Notes are given on potato canker, due to *Chrysophlyctis endobiotica*, and observations made on the relative susceptibility of different varieties of potatoes to the disease, its introduction through the planting of infected tubers, and the distribution of the fungus through the soil.

Investigations on the influence of cultivation and fertilizers on the leaf curl and bacterial disease of potatoes, B. STEGLICH (*Sächs. Landw. Ztschr.,*

57 (1909), No. 17, pp. 296–298).—Studies were made of 25 varieties of potatoes in which the effect of cultural methods and different applications of fertilizers on leaf curl and bacterial ring disease was investigated. Tubers were planted at different depths, large and small whole tubers and cuttings were compared, and the relative effect of stable manure together with other fertilizers, large applications of nitrate of soda, and the addition of lime were all tested.

The effect of the different treatments on the diseases could not be definitely stated, as many of the varieties differed widely in susceptibility and probably in the amount of their previous infection. Unusual depth of planting, either too deep or too shallow, was found to be unfavorable to the plants. In many cases it was impossible to demonstrate the presence of the organisms causing the disease, but the author believes that the lowered yields indicated the occurrence of the fungi or bacteria even when microscopical and bacteriological means failed to reveal their presence.

The author is led to believe that these diseases of potatoes are of an enzymic nature and that the fungi and bacteria are of secondary importance.

Directions for spraying potatoes, J. G. Milward (*Wisconsin Sta. Circ. Inform. 3, pp. 8, figs. 3*).—According to the author the early blight often develops rapidly in Wisconsin after August 1. Only the standard medium late and late varieties are much benefited by spraying with Bordeaux mixture. It is recommended that not less than 4 applications be given and that the spraying begin not later than August 15. Where potatoes are grown on fertile soil and the vines have made a healthy growth the spraying will usually be followed with good results, but on poor soil where the growth is scanty it will seldom be found profitable. The cost of spraying any considerable area should not exceed $3.20 per acre.

Directions previously noted (E. S. R., 20, p. 948) are given for the preparation and application of Bordeaux mixture and arsenicals, together with suggestions on spraying machinery.

Observations concerning the American gooseberry mildew, 1906–1908, G. Lind (*K. Landtbr. Akad. Handl. och Tidskr., 48 (1909), No. 1, pp. 33–51, fig. 1*).—The results of three years' work conducted by the horticultural department of the experiment station at Albano, Sweden, are given, with conclusions as to the best methods of controlling the disease.

Apoplexy of grapevines, L. Ravaz (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 30 (1909), No. 45, pp. 574–579, pl. 1, dgms. 4*).—A description is given of a disease of grapevines due to a fungus, probably *Polyporus igniarius*. Old vines seem most subject to the disease, and when cut into, the trunks are more or less filled with matted masses of the fungus mycelium. Considerable loss is reported in the Mediterranean region due to this cause.

If the stock is not badly affected it is recommended that the diseased tissues be cut out and the wounds covered with tar. When the fungus has severely attacked the vines the diseased specimens should be entirely destroyed.

Treatment for powdery mildew, G. Chappaz (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 30 (1909), No. 18, pp. 532–536, pl. 1*).—For the prevention of powdery mildew of grapes the author recommends mixed treatments as being efficient and saving of labor. Sulphur may be combined with some of the copper solutions for the first, third, and subsequent applications. For the second application it is suggested that sulphur alone should be used and that it should be applied just before the flowering of the grapes begins. By following this plan both powdery and downy mildew may be combated at a considerable saving of labor.

Grape spraying experiments in Michigan, 1907–8, C. L. Shear and L. A. Hawkins (*Michigan Sta. Spec. Bul. 49, pp. 3–16, figs. 6*).—This is a detailed

account of spraying experiments carried on in cooperation between the station and the Bureau of Plant Industry of this Department, a previous report of which has been noted (E. S. R., 22, p. 50).

Spraying for peach fruit spot, A. B. CORDLEY and C. C. CATE (*Oregon Sta. Bul. 106, pp. 3–15, figs. 8*).—Peach fruit spot, it is said, has occasioned considerable loss in Oregon and experiments have been carried on for its control. The investigations thus far conducted have shown that this disease, which occurs not only on the peach but also on the apricot, can be practically eliminated by spraying. Good results can be obtained with either Bordeaux mixture or lime-sulphur solutions, but so far the results are in favor of the Bordeaux mixture.

In connection with the spraying for the prevention of this disease fall applications of fungicides seem to be essential and are apparently the most efficient. For this purpose, if the San José scale is present, lime-sulphur solution should be used; if not, Bordeaux mixture may be used if preferred. The fall application is said to be beneficial also in controlling the peach twig blight.

The peach fruit spot fungus attacks the fruit between May 10 and June 15, and the first summer spraying should be made about May 10 and the second about June 1. Other applications should be made depending upon the season.

The bleeding stem disease of the coconut tree in Ceylon, T. PETCH (*Brit. Mycol. Soc. Trans., 3 (1908), pt. 2, pp. 108, 109*).—A description is given of a disease of the coconut tree, a preliminary account of which has been noted (E. S. R., 20, p. 347).

This disease is of fungus origin and is due to *Thielaviopsis ethacetícus*. The attack is principally upon the stem, where the presence of the fungus may be noted by the occurrence of rusty wet patches on the bark, which turn brown and finally black. On cutting into the stem the internal tissues are found to be decayed. At first the diseased tissue is of small extent and well defined, but diseased areas coalesce and finally involve the whole stem.

The preventive measures recommended are the same as those previously described, and consist of cutting out the diseased tissues, scorching the interior of the wound with torches, and painting with hot coal tar.

A fungus parasite of rubber, B. FUNK (*Trop. Agr. and Mag. Ceylon Agr. Soc., 32 (1909), No. 5, p. 502; Agr. Bul. Straits and Fed. Malay States, 8 (1909), No. 7, p. 312*).—An account is given of a disease of cacao and rubber trees due to *Hymenochæte noxia*. This fungus is said to produce a curious brown growth on the roots, causing their destruction.

A new fungus pest of Para rubber, H. N. RIDLEY (*Agr. Bul. Straits and Fed. Malay States, 8 (1909), No. 7, pp. 310–312*).—A description is given of a fungus disease of Para rubber, in which the branches of the trees are destroyed by the attacks of a bark fungus hitherto unknown to the author. The attack seems to begin on the shoots, which turn black, and the disease continues to descend the trunk of the tree, which is eventually destroyed.

Examination of the material showed the presence of a fungus which is believed to be allied to the genus Cucurbitaria parasitic on Laburnum in Europe.

Notes are given on the distribution of the fungus. From the accounts presented it is apparently very rapid in its destruction of young trees.

Pruning the trees, cutting well below the affected portions, and the use of a fungicide to prevent the germination of spores are recommended as preventive measures.

The biology of Armillaria mucida, C. E. C. FISCHER (*Ann. Bot. [London], 23 (1909), No. 92, pp. 515–535, pls. 2*).—A study was made of this fungus, which is said to be common wherever beech trees occur, in order to trace its life

history, investigate its action on the wood, and determine preventive and remedial measures.

The fungus was found to grow saprophytically on various substances, but all attempts to infect living beech wood failed and no proof could be obtained to indicate that it is strictly parasitic in its growth. It was found to excrete enzyms which liquefied gelatin, dissolved starch, and reduced lignin to cellulose. Its decomposition products contained neither tannin nor oil.

Among the remedial and preventive measures for the control of this fungus the author recommends the treatment of the wounds on trees with an antiseptic, and the removal and destruction of the diseased parts before the sporophores reach maturity.

Studies on the biology of Gymnosporangium juniperinum, E. FISCHER (*Ztschr. Bot., 1 (1909), No. 11, pp. 683–714, figs. 8*).—In continuation of the author's investigations on heterœcious fungi, a study is reported giving the results of inoculation and other experiments with *G. juniperinum*, the æcidial stage of which occurs on species of Sorbus and Amelanchier.

Studies of Xylaria hypoxylon, R. HARDER (*Naturw. Ztschr. Forst u. Landw., 7 (1909), Nos. 8, pp. 429–436, fig. 1; 9, pp. 441–467, figs. 16*).—Studies are reported of *X. hypoxylon*, a little known fungus that attacks various kinds of trees.

On investigating the life history of the fungus the author found that in addition to its being a saprophyte it could under some conditions become an active parasite, attacking living wood. The wood attacked by this fungus has a peculiar black color, which is not believed to be primarily due to the Xylaria but is attributed to accompanying fungi. The rot produced by Xylaria is white or yellowish in color, but it is surrounded and penetrated by the black crust-like formations, which are very characteristic of this trouble. There appear to be two kinds of mycelium present, one of the forms being colorless, the other dark brown. The nature of the coloring matter was investigated, but it has so far proved resistant to reagents.

Some fungus parasites of algæ, G. F. ATKINSON (*Bot. Gaz., 48 (1909), No. 5, pp. 321–338, figs. 8*).—Descriptions are given of a number of new species of fungi found to occur on Spirogyra and other algæ.

Experiments in combating nematodes, J. KÜHN (*Deut. Zuckerindus., 34 (1909), No. 44, Beilage 1, pp. 841, 842*).—An account is given of the experiments which have been carried on at the agricultural institute of the University of Halle since 1900 in which catch crops are grown for the purpose of removing nematodes. In one series of experiments in which sugar beets followed the catch crops the yield of sugar beets was 168 centners per morgen (about 29,286 lbs. per acre) as compared with 94 centners where catch crops were not used.

Bordeaux mixture, how to make and apply it, P. J. O'GARA (*Rogue River Fruit Grower, 1 (1909), No. 7, pp. 1–3*).—Directions are given for the proper making of Bordeaux mixture on a large scale and suggestions offered concerning its application for the control of apple diseases and similar troubles.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

A bibliography of the Russian fauna, T. KÖPPEN (*Bibliotheca Zoologica Rossica. St. Petersburg, 1905, vol. 1, pp. XVI+552; 1908, vol. 2, pp. VII+532*).—The literature up to 1885, relating to the animals of Russia, is here brought together and classified.

Antiplague operations on the Pacific coast for the fiscal year 1909, and to November 1, 1909 (*Pub. Health and Mar. Hosp. Serv. U. S., Pub. Health Rpts., 24 (1909), No. 50, pp. 1847, 1848*).—In San Francisco, the number of rats

caught during the period under report was 156,059, of which 93,558 were examined. In Oakland, 25,889 were caught, of which 16,593 were examined, 2 being found infected with plague. In Los Angeles, in August, 1908, a case of human plague was reported, and shortly afterwards a ground squirrel was found with plague infection. During the period from September 24, 1908, to April 12, 1909, 13,992 animals were killed and examined for plague infection, including 4,722 ground squirrels and 8,977 rats, but none was found infected. In Seattle, during the fiscal year, 51,750 rats were caught and 48,652 examined, 10 being found infected. In the campaign against ground squirrels in Contra Costa County, Cal., up to October 30, 44,843 squirrels had been destroyed, of which 298 were found to be infected.

The plague eradicative measures (squirrel campaign) in Contra Costa County, California, W. C. RUCKER (*Jour. Amer. Med. Assoc., 53 (1909), No. 24, pp. 1995–1999, fig. 1*).—This is a more detailed account than that previously noted (E. S. R., 22, p. 153).

The author describes the epizootic that destroyed great numbers of ground squirrels in 1904, 1905, and 1906. This is supposed to have been bubonic plague, as this disease was found in 1908 to be epizootic in these animals. In a careful study of the habits of the squirrels (*Citellus beechyi*), it was found that they spend the winters, that is the wet months, in the foothills, and that there the young are born. They are usually collected into colonies and sometimes dig very extensive burrows, honeycombing an entire hillside. The nest is formed of straw and pieces of soft bark and is usually alive with fleas. Commercial carbon bisulphid and poisoned wheat gave good results in poisoning the squirrels.

"Carbon bisulphid seems to be the ideal agent for the extermination of squirrels in a plague campaign, for the reason that it not only kills the squirrels, but also the fleas on them, and in the tunnels, thus precluding the possibility of infected fleas remaining to perpetuate the epizootic in another colony of squirrels subsequently occupying the same burrow. . . . The poisonous agent used in treating wheat is either strychnin sulphate or cyanid of potassium, preferably a mixture of the two, applied to wheat with a little glucose, or other sweet material, and then dried. . . . Phosphorus has not proved as useful in the destruction of ground squirrels as in the poisoning of rats. . . . Several varieties of traps have been experimented with, but none has proved very successful."

The squirrels as shot are shipped to the laboratory at San Francisco for examination, a total of about 250 having been found up to October 1, 1909, to be infected.

Special report on the decrease of certain birds, and its causes, with suggestions for bird protection, E. H. FORBUSH (*Boston, 1908, 2. ed., rev., pp. 118, pls. 2, map 1*).—A second revised edition (E. S. R., 17, p. 1088).

Protozoology, G. N. CALKINS (*New York and Philadelphia, 1909, pp. IX+349, pls. 4, figs. 125*).—An introduction to the study of modern protozoology. In chapter 1, the general morphology, the organs of locomotion and the classification are considered. The following chapters are devoted to the physiological activities of the protozoa; protoplasmic age of protozoa; conjugation, maturation, and fertilization; parasitism; pathogenic flagellates (3 chapters); pathogenic hemosporidia; and pathogenic rhizopoda.

An extensive bibliography is appended.

On the relation of certain cestode and nematode parasites to bacterial disease, A. E. SHIPLEY (*Jour. Econ. Biol., 4 (1909), No. 3, pp. 61–71, fig. 1*).—A paper read before the Association of Economic Biologists at Oxford, July 13, 1909.

The rôle of Collembola in economic entomology, W. E. COLLINGE (*Jour. Econ. Biol., 4 (1909), No. 3, pp. 83–86, fig. 1*).—It is concluded that probably all Collembola are more or less injurious to plant life. A list is given of 13 species which are distinctly injurious.

On the presence of a flagellate parasite in the latex of Euphorbia pilulifera, A. LAFONT (*Compt. Rend. Soc. Biol. [Paris], 66 (1909), No. 22, pp. 1011–1013*).—The author reports the discovery of a flagellate in the latex of *E. pilulifera* on the Island of Mauritius. This parasite presents all the characteristics of the genus Leptomonas (Herpetomonas in the sense of certain authors) and is given the name *Leptomonas davidi*. The plants examined have varied in infestation from none to immense numbers. The parasitized plant loses its leaves and growth is retarded. Of 144 individual plants collected from different parts of the island, 49 were parasitized. The sap of 21 additional species of plants was examined without finding the parasite.

Herpetomonas aspongopi, W. M. ADERS (*Parasitology, 2 (1909), No. 3, pp. 202–207, figs. 2*).—The author has found *H. aspongopi* to be a true parasite of the melon bug (*Aspongopus viduatus*) at Khartoum. The complete life cycle of development takes place in the alimentary tract of the bug. The parasite is not transmitted hereditarily but is probably conveyed from host to host by the ingestion of feces containing resting forms.

Note on two new flagellate parasites in fleas, DORIS L. MACKINNON (*Parasitology, 2 (1909), No. 3, pp. 228–296, pl. 1*).—*Herpetomonas ctenophthalmi* and *Crithidia hystrichopsyllæ* are described as new.

Report of the entomologist, T. J. HEADLEE (*Kansas Sta. Rpt. 1908, pp. XLVII–LIII*).—The noxious insects and rodents mentioned include the Hessian fly, corn ear-worm, chinch bug, greater wheat straw worm, green bug, fall army worm, fall webworm, elm twig girdler, pocket gopher, and prairie dogs.

In cooperation with the Bureau of Entomology of this Department, a study of the Hessian fly was made in Sumner County. It was found that in May many of the flaxseeds formed in the spring gave up adult flies that laid eggs upon young plants sprouting up from the bases of the older plants. Biological studies as related to the control of the pest are now under way.

A careful study of the green bug and its parasitic enemies both in the field and laboratory was carried on. The rate of reproduction of the green bug at different temperatures and its ability to withstand low temperatures as well as the rate of reproduction of the principal parasites under different temperatures and the effect of low temperature on its mortality are said to have been determined. "The present state of the work would indicate the parasite *Lysiphlebus tritici* to be, under proper conditions of temperature, a most effective check on the green bug; that it can survive lower temperature than the green bug; that it can use several common species of plant lice as hosts, and is therefore unlikely to be totally absent from any locality in this State where the green bugs are present in damaging numbers; that the destruction of volunteer wheat and oats, thus depriving the green bug of some of its common summer food plants, would help to prevent it from infesting the regular crop; and that plowing under spots of seriously infested wheat is effective in preventing further spread from those spots."

Insects of the year, H. T. FERNALD (*Massachusetts Sta. Rpt. 1908, pt. 1, pp. 75–77*).—In this brief report mention is made of the San José scale, elm-leaf beetle, green-striped maple-worm, brown-tail moth, etc. *Heterocampa guttivitta*, previously noted as occurring in Maine and New Hampshire (E. S. R., 21, p. 759) appeared in forest areas in the western part of the State. The oriental moth has continued to spread but has not thus far shown any indica-

tion of becoming an important pest. The discovery of gipsy moth egg clusters in the Connecticut Valley during the spring indicates that sooner or later this insect may be found in all parts of the State.

Report of the entomologist, W. V. TOWER (*Porto Rico Sta. Rpt. 1908, pp. 23–28, pl. 1*).—Particular attention was given to insects affecting the orange and pineapple. Among the new lines of work taken up were the fumigation of pineapple slips for the mealy bug, the destruction of ants in pineapples and oranges, and the determination of the value of various oil emulsions used by planters in combating the purple and white scales.

It is stated that at present the hemispherical scale (*Saissetia hemisphærica*) can be found in groves only in limited numbers. The purple scale (*Lepidosaphes beckii*), however, is the source of injury in all plantations not protected from the wind and where systematic spraying is not practiced. The life history of this scale has been worked out and is here described. It is recommended where kerosene and crude emulsions are used that a second application be made about 21 days following the first, as by this time the females which escape the first spraying have deposited eggs and these have had time to hatch.

The life history of the red scale (*Chrysomphalus ficus*) has also been worked out. It was found that the female develops in about the same time as the female of the purple scale but unlike that species the young come forth at a definite period. It is said to be much harder to kill than the purple scale. The white scale (*Chionaspis citri*) appeared in a large number of the older groves during the season and was a source of considerable injury. It requires about the same time for the completion of its life cycle as does the purple scale. While this insect is not preyed upon by as many fungi as the purple scale one fungus has been found attacking it. As a remedy kerosene emulsion 1 : 7 or 1 : 8, or crude oil emulsion, 1 part of stock solution to 20 parts of water, is recommended. 3 applications to be made at intervals of 3 weeks. The rufous scale (*Pseudaonidia articulatus*) was found in a few groves causing slight injury.

The orange leaf weevil (*Diaprepes spengleri*), previously described as appearing during the latter part of May, was observed in large numbers during November, there being 2 broods during the year. The "vaquita," a small green beetle, is reported to have been the source of injury in orange groves on the northern coast. "Caculos" and May beetles were the source of injury in young groves, one or two cases having been reported where young trees were defoliated.

The mealy bug has been found in all the pineapple sections of the island. Very satisfactory results were obtained from the fumigation of slips and suckers with hydrocyanic-acid gas, 1 oz. of potassium cyanid to every 100 cu. ft. being used. The coffee weevil was found in a number of plantations around Ponce, and in some districts the planters complained that it did a great deal of damage. The coffee stem borer was reported as the source of some damage in 1 or 2 localities.

Five nuclei of Italian bees purchased in July had developed sufficient bees by December 13 to raise a brood and develop 17 frames of comb, 10 of which were filled with honey. The fungus causing mummy disease of guavas is thought to have entered young fruit through the punctures of mealy bugs. Kerosene emulsion, 1 part of stock to 6 or 7 of water, was found to control these bugs. Great numbers of thrips observed on the under side of mango leaves are thought to have been the indirect source of injury through their punctures being entrance points for the spores which produce anthracnose. The formula 1 pt. of crude carbolic acid (100 per cent crude), ½ lb. of whale oil or common laundry soap, and 1 qt. of water, proved very effective in destroying ants' nests.

Some observations concerning injurious insects, SOFIE ROSTRUP (*Tidsskr. Landbr. Planteavl, 16 (1909), No. 2, pp. 283–302, figs. 6*).—This article treats of

injurious insects of minor importance which appeared in Denmark during the years 1907–8.

Reports of injurious insects in Finland in 1906–7, E. Reuter (*Landtbr. Styr. Meddel., 1909, Nos. 64, pp. 17; 69, pp. 26*).—The author here reports upon the insects of economic importance in Finland during the years 1906 and 1907. The occurrence of several fungus diseases is also noted.

A handbook of the destructive insects of Victoria, with notes on the methods to be adopted to check and extirpate them, C. French (*Melbourne, 1891, pt. 1, pp. 153+IV, pls. 27; 1893, pt. 2, pp. 222, pls. 32; 1900, pt. 3, pp. 229, pls. 46; 1909, pt. 4, pp. 195, pls. 34*).—The accounts here given of insects of economic importance are accompanied by colored plates which illustrate their life history, injury, and natural enemies.

Standards of the number of eggs laid by insects, VIII, A. A. Girault (*Ent. News, 20 (1909), No. 8, pp. 355–357*).—Records of counts made of 20 egg masses each of *Chionaspis americana*, *C. pinifoliæ*, *C. salicis*, and the oyster-shell scale are reported.

The life history of the agrionid dragon fly, F. Balfour-Browne (*Proc. Zool. Soc. London, 1909, II, pp. 253–285, pls. 2, chart 1*).—In these studies nymphs were first fed upon Paramœcia which they ate readily. As they grew the Paramœcia were replaced by daphnids, of which they caught and demolished large specimens. The daphnids are said to have served as food all through the nymph stage after the protozoa became insufficient.

A bibliography of 23 titles relating to the biology of the Odonata is appended.

Destruction of houtkapper white ants (*Agr. Jour. Cape Good Hope, 35 (1909), No. 1, pp. 81, 82, fig. 1*).—The ant destroyer machine here described is said to have been used with good results in the destruction of termites. While many kinds of true ants can also be readily destroyed in their nests and runs with the aid of this apparatus, it is not at all applicable to *Iridomyrmex humilis* which has become a nuisance in and about many colonial towns.

The periodical cicada in Massachusetts, C. W. Hooker (*Massachusetts Sta. Rpt. 1908, pt. 2, pp. 200–210*).—Four species of cicada (*Cicada septendecim*, *C. canicularis*, *C. sayi*, and *C. linnei*) are said to be commonly found in Massachusetts, while two others (*C. rimosa* and *C. hieroglyphica*) occur but are not common. Although the periodical cicada has not been recorded from Maine and New Hampshire and only twice from Vermont, the rest of New England has parts of several well-defined broods which are more or less important. The earliest known record of the occurrence of this species was at Plymouth, Mass., in 1633. Massachusetts is credited with 4 broods, and members of a fifth have probably entered the State. The history of each brood is here reviewed.

The first brood, which occurs in Barnstable and Plymouth counties, last appeared in 1906. Part of the second brood occurs in Dukes County and last appeared in 1900. The third brood, which was due to appear in 1903, seems to have died out in Massachusetts, while the fourth brood reported by Fitch to occur in the southeastern part of Massachusetts is, if still active in the State, small and of no importance. No colony of the fifth brood has been reported in Massachusetts, but they come so close to the state line on the southwest that stragglers at least must have crossed into Massachusetts when they last appeared in 1894.

An annotated bibliography of 26 titles is appended to the account.

The cane sucker, F. W. Urich (*Dept. Agr. Trinidad, Bul. Agr. Inform., 1909, n. ser., No. 61, pp. 43–45, pl. 1*).—The larvæ of *Castnia licus* are said to have injured a large percentage of the sugar-cane stools in one district in Trinidad. The pest also appears to injure the banana and coconut.

The Desmodium aphid, Microparsus variabilis n. sp., EDITH M. PATCH (*Ent. News, 20 (1909), No. 8, pp. 337-341, pls. 2*).—This paper forms Entomological Contribution No. 35 from the Maine Station.

M. variabilis, which has for the past 2 years been present in enormous numbers upon the Canadian or showy tick-trefoil (*Desmodium canadense*), is here described as representing a new genus and species. The entire life cycle of the colonies observed is passed on this plant. "The species reproduces upon the trefoil during the summer, and during July the colonies of apterous and alate viviparous forms thickly crowd the tips of the branches and the ventral surface of the leaves, which become badly twisted and curled. From the middle of August to the middle of September the true sexes, the winged males and the apterous oviparous females, are abundant."

A new pest of the Florida orange, E. A. BACK (*Fla. Fruit and Produce News, 2 (1909), No. 9, p. 5*).—The author calls attention to the fact that a species of white fly, distinct from the citrus white fly (*Aleyrodes citri*) and the spotted-wing white fly (*A. nubifera*), has been discovered for the first time in this country. This white fly has been found on orange trees at Tampa, Fla., where it has become of economic importance. The species is said to have been known for several years to infest orange trees on several of the islands of the West Indies, particularly Cuba.

The San José scale and methods of controlling it, W. E. BRITTON (*Connecticut State Sta. Bul. 165, pp. 3-24, figs. 12*).—This is a revised and enlarged edition of Bulletin 135 previously noted (E. S. R., 13, p. 766). In an abridged edition of the former list of food plants common names are used in place of Latin names. The pest is said to have now spread to nearly every portion of the State. Natural enemies are not very effective in holding it in check in Connecticut, the most important being 2 species of lady beetles.

The gloomy scale, F. SHERMAN, Jr. (*Bien. Rpt. Comr. Agr. N. C., 1907-8, p. 520*).—It has been found that this scale does not attack the hard maples, even when grown close to badly infested soft maples. An examination, in several places, notably in Robeson County, has shown many red and silver maples dying under the attacks of this pest, while the sugar and Norway maples were found flourishing.

New observations on the olive tineid (Prays oleæ), T. DUMONT (*Compt. Rend. Acad. Sci. [Paris], 148 (1909), No. 21, pp. 1408, 1409*).—An account of studies of the life history and habits of this pest. There was found to be a considerable variation in the period required for the life cycle, this depending largely upon the kind of food on which the larvæ fed.

Insect plague in Saxony, T. H. NORTON (*Daily Cons. and Trade Rpts. [U. S.] 1909, No. 3566, pp. 8, 9*).—The nun moth *Ocneria* (*Liparis*) *monacha* was the source of great injury to Saxon forests in 1908. At Zittau, powerful suction ventilators were stationed between electric arc lamps and large numbers of the moths destroyed.

"In the perfected device, as finally adopted, 2 searchlights are employed. They are adapted for currents from 30 to 50 amperes and are shielded in front by highly polished glass disks. In front of them and somewhat lower are the 2 arc lamps regulated for currents of 10 amperes and protected by glass globes. Immediately below and between these 2 lamps is the opening of the ventilator. An electric motor attached to this produces 1,200 revolutions per minute, and sucks through about 2,800 cu. ft. of air in the same time. The outgoing blast of air enters an open box alongside, 3 sides of which are composed of wire netting. In this the moths meet their fate, and it is emptied as fast as their bodies accumulate in such quantities as to obstruct the free passage of the air blast. Four of these devices were installed in the town of Zittau upon the

roofs of the electrical works, the town hall, a schoolhouse, and a factory. The effectiveness of this new destructive agency seems to have been somewhat variable and dependent upon meteorological conditions. The maximum result attained in a single night by such an installation as above described was a total weight of 141 lbs., representing about 400,000 dead moths. Frequently, however, the weight would be less than 70 lbs."

At times females showed a slight numerical predominance and generally they composed at least 40 per cent of the slaughtered insects. Similar experiments on a smaller scale, in which the electric arc was replaced by acetylene lamps, were instituted in the heart of the forest, and gave satisfactory results.

Tineids attacking pears, P. PASSY (*Rev. Hort.* [*Paris*], *81* (*1909*), *No. 16*, *pp. 386–389*, *figs. 6*).—In France *Coleophora hemerobiella* and *C. flavipenella* frequently injure the pear, although the latter species seems to prefer the apple.

The robber-flies of America, north of Mexico, belonging to the subfamilies Leptogastrinæ and Dasypogoninæ, E. A. BACK (*Trans. Amer. Ent. Soc.*, *35* (*1909*), *No. 2–3*, *pp. 137–400*, *pls. 11*).—Thirty-six genera and 194 species are recognized of which 1 genus and 20 species are here described as new.

Tabanidæ of Brazil and neighboring countries, A. LUTZ (*Zool. Jahrb.*, *1909*, *Sup. 10*, *No. 4*, *pp. 619–692*, *pls. 3*).—In this work several genera and many species are described as new to science. Fifty-seven species are portrayed in colors.

The breeding of the common house fly (Musca domestica) during the winter months, F. P. JEPSON (*Jour. Econ. Biol.*, *4* (*1909*), *No. 3*, *pp. 78–82*).—A paper read before the Association of Economic Biologists at Oxford, July 13, 1909.

A possible natural enemy to the mosquito, J. M. ATKINSON (*Lancet* [*London*], *1909*, *II*, *No. 10*, *pp. 708–710*, *figs. 3*; *Jour. Trop. Med. and Hyg.* [*London*], *12* (*1909*), *No. 17*, *pp. 255, 256*, *figs. 3*).—The author reports that an Anthomyid (*Lispa sinensis*) has been observed near Hong Kong feeding upon mosquito larvæ.

Contribution to the study of the mosquitoes which live in salt water, A. CLERC (*Compt. Rend. Soc. Biol.* [*Paris*], *66* (*1909*), *No. 3*, *pp. 120, 121*).—Young Anopheles larvæ transferred from stagnant to salt water died in 1 or 2 hours but more mature larvæ lived and in 4 or 5 hours transformed to nymphs, then to imagos. The adults bred were apparently *Anopheles maculipennis*.

The regional distribution of fleas on rodents, G. W. MCCOY and M. B. MITZMAIN (*Parasitology*, *2* (*1909*), *No. 3*, *pp. 297–304*).—From the data presented it appears that the favorite location for the common rat fleas in the vicinity of San Francisco, *Ceratophyllus fasciatus* and *Læmopsylla cheopis*, is about the hind quarters of the rat, while *Ctenopsyllus musculi* prefers the region of the head and neck. The same regional distribution of rat fleas was found in the case of guinea pigs. Squirrel fleas are most numerous on the hind quarters.

Revision of the New Zealand Cossonidæ, with descriptions of new genera and species, T. BROUN (*Trans. New Zeal. Inst.*, *41* (*1908*), *pp. 151–215*, *pls. 2*).—Forty-one genera and 141 species are here described.

On the Ichneumonid genus Echthromorpha, R. KREIGER (*Mitt. Zool. Mus. Berlin*, *4* (*1909*), *No. 2*, *pp. 295–344*, *figs. 20*).—Nine of the 17 species recognized are described as new.

[The North American Cynipidæ and their galls], W. BEUTENMÜLLER (*Bul. Amer. Mus. Nat. Hist.*, *23* (*1907*), *pp. 629–651*, *pls. 5*, *figs. 4*; *26* (*1909*), *pp. 29–66*, *135–145*, *243–256*, *277–281*, *pls. 17*).—Each of the first 4 of these papers is devoted to the species of a single genus, the genera considered being Rhodites, Holcaspis, Amphibolips, and Diastrophus, respectively. In the fifth paper the

species of Biorhiza, Philonix, and allied genera are taken up. Numerous illustrations of the galls formed accompany the accounts.

Ants of Formosa and the Philippines, W. M. WHEELER (*Bul. Amer. Mus. Nat. Hist., 26 (1909), pp. 333–345*).—Twenty species are listed from Formosa of which 2 species and 2 subspecies are described as new to science. In a complete list here given, of the species known to occur in the Philippine Archipelago, 70 are recorded of which 2 are decribed as new to science.

Papers on cereal and forage insects. The lesser clover-leaf weevil, F. M. WEBSTER (*U. S. Dept. Agr., Bur. Ent. Bul. 85, pt. 1, pp. 12, figs. 8*).—This discusses the history of *Phytonomus nigrirostris*, first in Europe showing that it occurs from Scandinavia southward into Egypt and Asia Minor, then in America, bringing out the fact that it is injurious only throughout the northern and central Atlantic coast region, never having been abundant inland. It seems probable that the species was introduced into either Canada or New England early in the last half of the last century. The diffusion of the weevil southward is said to be more or less obscure, but it is suggested that it may have been carried by streams or winds to the ocean, thence southward and deposited by the tides on the shores of the Chesapeake Bay. While known for some time both to the north and south of the District of Columbia, only within the last two years has it become at all abundant within the District. Notes are given on interrupted investigations carried on there during 1909.

In the vicinity of Washington, D. C., the adults come forth from their hibernation in the fields as soon as warm weather starts the young growth of the clover, probably during the last of March in ordinary seasons. Females collected on April 1, during the somewhat cold and backward spring of 1909, deposited eggs indoors on April 6. The egg period was found to vary from 7 days 20 hours to 8 days 12 hours. The larval period varies from 17 to 20 days, during which time 2 molts are passed. The pupal stage occupies normally about 6 days, and the entire period from egg to adult about 32 days. While there is clearly but a single annual generation, the breeding season is greatly prolonged, egg deposition probably covering upward of 6 weeks and late in the season all stages may be observed at the same time. While the larvæ can feed on all parts of the clover plants above ground, they prefer the tenderest unfolding leaves and in the fields select these parts and feed among the folds; later they attack the heads, both young and in full bloom. After emerging the adults probably scatter abroad over the fields and hibernate among the leaves, matted grass, and other rubbish. The red, mammoth, crimson, white, and alsike clover, and alfalfa serve as food plants. Technical descriptions are given of the stages.

A tachinid (*Anisia* sp.) and a species of Bracon have been reared from the larvæ. The pupæ are destroyed by a fungus (*Empusa* [*Entomophthora*] *sphærosperma*).

A bibliography of 12 titles is appended.

Papers on cereal and forage insects.—The slender seed-corn ground-beetle, W. J. PHILLIPS (*U. S. Dept. Agr., Bur. Ent. Bul. 85, pt. 2, pp. 13–28, figs. 6*).—This paper is based upon observations carried on for several years in the vicinity of New Paris, Ohio.

The pest (*Clivina impressifrons*) works below ground in the kernels of corn and confines itself to swampy, peaty soils, sometimes as many as 15 or 20 individuals being found in or about a single hill. It has been reported from New York and New Jersey and as far west as Kansas and Iowa. Descriptions are given of its several stages, with life history notes. The larvæ are said to devour larvæ and pupæ of other insects and will, in confinement, destroy each other; they are very difficult to rear and in no case can be carried further than 1 or

2 molts. In the field they are found from a depth of a few inches to about 2 ft. The pupal stage lasts from 9 to 10 days. When found in the field the pupa is always inclosed in a little, oblong, earthen cell, about $\frac{1}{3}$ in. long. The species breeds throughout the entire season, very small larvæ up to full-grown pupæ and adults being found during the entire season. The winter is passed in the adult stage.

As soon as the corn is planted and starts to germinate the beetles begin to attack it, as many as 5 beetles having been taken from a single kernel. Sometimes the young plant may push through the earth to the surface of the ground and then die, owing to the fact that the kernel has been destroyed and the root system has not been developed sufficiently to support it. Details are given of experiments in which a number of repellents were used, the best results being obtained with oil of cajeput, citronella, and lemon. It appears that the greater part of the damage may be avoided by late planting, as, in the vicinity of Richmond, Ind., corn planted about the middle of June is but little injured. A small mite (*Canestrinia* sp.) has been found which apparently destroys the beetle.

A bibliography of 13 titles is appended.

Insect enemies of corn, F. SHERMAN, Jr. (*Bien. Rpt. Comr. Agr. N. C., 1907–8, pp. 491–519, figs. 17*).—This article discusses the insects attacking the corn plant and the methods of dealing with them. Among the more important insects considered are the wireworms, cutworms, *Diabrotica 12-punctata*, corn-root webworm (*Crambus caliginosellus*), corn bill-beetle (*Sphenophorus callosus*), larger cornstalk borer (*Diatræa saccharalis*), chinch bug, corn earworm (*Heliothis obsoleta*), and grain weevils.

Some insects injurious to truck crops.—The parsnip leaf-miner. The parsley stalk weevil. The celery caterpillar, F. H. CHITTENDEN (*U. S. Dept. Agr., Bur. Ent. Bul. 82, pt. 2, pp. 9–24, figs. 6*).

The parsnip leaf-miner (*Acidia fratria*) (pp. 9–13).—This pest occurs from the Atlantic seaboard to the Pacific Ocean. It has appeared in the District of Columbia since 1903 in such considerable numbers that in some years beds of parsnips are so extensively infested by the maggot by July that 25 per cent of the leaves are destroyed. The larvæ under observation in 1908 transformed to pupæ May 22, and the first adults issued June 6. A chalcidoid parasite, *Syntomosphyrum* sp., was reared by the author from the maggot. As the fly shows a fondness for plants which run to seed, beds should not be planted in the vicinity of parsnip or other susceptible crops. Sprays of kerosene emulsion and carbolized kerosene emulsion which have been reported to be successful in the treatment of young plants affected by the celery leaf-miner, are suggested for use as deterrents.

The parsley stalk weevil (*Listronotus latiusculus*) (pp. 14–19).—Following an account of its injurious occurrence, technical descriptions are given of the stages. Mention is made of injury by the insect at Four Mile Run, Va. The eggs are deposited in parsley stalks in which the larvæ live and from which they bore down into the roots. In some cases plants are killed by its punctures, particularly when quite small and delicate, in which case the larvæ desert the stems by tumbling out to the ground into which they crawl and attack the roots by boring in from outside. The insect has also been found in the seed capsules or heads and in stalks of the common arrowhead (*Sagittaria variabilis*) and in the lower parts of reeds (Phragmites). It is thought that the pest can be reached with bisulphid of carbon or kerosene emulsion applied about the roots in the same manner as for maggots and similar insects.

The celery caterpillar (*Papilio polyxenes*) (pp. 20–24).—Descriptions are given of its stages, followed by an account of its distribution, life history, and habits. It appears to have no special life zone, occurring from Canada southward through Central America and the West Indies to South America at least as far as Venezuela. Its principal insect enemies are species of ichneumon flies (*Trogus exesorius* and *T. cxidianator*), *Apanteles lunatus* and a dragon fly (*Anax longipes*). When the species become too numerous to be kept in control by handpicking arsenicals will control the pest.

Spraying apples for curculio and codling moth, E. P. TAYLOR (*Missouri Fruit Sta. Bul. 21, pp. 9–69, figs. 18*).—The important facts in the life history and habits of the plum curculio are first discussed. It was found that "a single male and female kept in a cage for over 3 months and supplied with fresh fruit made a total of 721 separate egg or food punctures. Had they been distributed singly in the apples in the orchard 4.8 bu. of apples, estimating 150 per bushel, could have received punctures from this single pair."

A review of the life history and habits of the codling moth then follows. "In 1908 the first hibernating larvæ found changed to pupæ in the orchard at Olden were on April 6, and the first moth was seen in the orchard May 5. At this date the first few scattering eggs were found on apple leaves of early blooming varieties. The first eggs were found hatched on Ingrams, May 23, when this variety measured about ½ to ¾ in. in diameter. The maximum hatching of eggs did not take place for 10 days to 2 weeks following, and a few stragglers were entering the apples well into the month of June. The dates at which the first generation larvæ enter apples has a very important bearing upon the times of sprays. . . .

"A few apples were found with worms escaped by June 11, and larvæ preparing to pupate were first caught under burlap bands on trunks June 16. From this date forward almost up to the time the apples were picked in October, larvæ continued beneath the bands. . . . The first moth of the second generation was secured on June 29, and a number of others were secured during the first week of July. Early in July the first of the second generation eggs were to be found, though the maximum number did not appear for some weeks later." A freshly deposited codling moth egg was found while examining apples on October 7, probably being one of the third generation of the insect.

A practical spraying experiment was conducted in 1908 upon a block of about 20 acres of Ingram apples in a large commercial Ozark apple orchard for the purpose of showing the best kind of spray, the proper time to spray, and the best way to spray apples to prevent codling moth and curculio injury. Three early sprays resulted in 97.6 per cent picked apples free from curculio crescents while 45.5 per cent were damaged on the trees unsprayed. Of these apples 99.83 per cent were free from codling moth wormholes, 14.5 per cent being infested on the trees unsprayed, and 97.4 per cent of the apples were free from both kinds of injuries as compared with 46.1 per cent from the unsprayed trees. The three early sprays by preventing windfalls also gave 45 per cent more picked apples than the unsprayed trees.

It was found that the spraying had doubled the cash returns for the crop, the net profit due to spraying amounting to $65.36 per acre, or $7 for every dollar expended for spraying.

It is considered that 3 early sprays, if thoroughly applied, will be sufficient to control both codling moth and curculio under the average conditions in Missouri. Paris green was not quite so efficient as arsenate of lead and, although used with every precaution, seriously damaged the fruit by causing blackened areas about the blossom end, nearly one-fourth of the picked fruit being rejected from the first grade for this cause. The rainy weather prevailing at the

time nearly all the sprays were applied intensified the damage from the Paris green, but the adjoining block treated similarly with arsenate of lead failed to develop more than about 1 per cent of apples blackened at the blossom end. In the picked fruit sprayed with arsenate of lead, 3.8 per cent bore either curculio crescents or codling moth wormholes, while 7.67 per cent bore these injuries in the plat sprayed with Paris green. Including both windfalls and picked fruit, 96.18 per cent in the arsenate of lead plat and 93 per cent in the Paris green plat were free from these injuries. This difference in cases of heavy yields of high priced fruit is thought to justify the use of the lead, even though the cost of the Paris green might be slightly less.

There seems to be good evidence that arsenate of lead possesses some fungicidal value as foliage was held on the trees in a vigorous condition late in the fall, while unsprayed trees adjoining were stripped early in the fall by fungus diseases.

Fumigation dosage for forcing crops, H. T. FERNALD (*Massachusetts Sta. Rpt. 1908, pt. 1, pp. 73, 74*).—A summary is here presented of hydrocyanic-acid fumigation experiments with tomatoes and cucumbers under glass which extended over a period of 4 years.

"Fumigation during sunlight can not be practiced without resulting in the serious injury or death of the plants. Fumigation during cloudy days is very unsafe at best and is not advised. Fumigation on moonlight nights is also unsafe, frequently resulting in considerable injury. Good results are obtained by fumigation on clear nights, without a moon, or on cloudy nights. The best results are obtained by fumigation on clear, dark nights, with a house temperature of from 55 to 65° F., followed by complete ventilation for from 15 to 30 minutes and a rather low temperature in the house the next day. Plants fumigated while drops of water remain on them are likely to be injured; fumigation should, therefore, be given only to plants not so recently watered as to have leaves or stems still wet. The moisture in the house (humidity) should not be high, to obtain the best results. Under the conditions above named, fumigation for tomatoes, using 0.01 gm. of 98 per cent potassium cyanid for each cubic foot of space for a period of 40 minutes, should insure satisfactory results, and the time with cucumbers could safely be extended to 1½ hours with advantage.

"In general, the experiments show that with tomatoes the period during which fumigation can safely be applied to the plants is hardly long enough to more than kill the adult white fly, but a repetition of the treatment 3 times at intervals of 2 weeks should be effective. With cucumbers, treatment can be prolonged with safety, but it is doubtful if the eggs can be destroyed, using a safe strength of the cyanid, and for this reason repetition of the treatment as with the tomato is desirable."

Analyses of Paris green and lead arsenate, C. S. CATHCART (*New Jersey Stas. Bul. 222, pp. 3–13*).—All of the 17 samples of Paris green analyzed contained the required 50 per cent of arsenious oxid combined with copper, but 7 samples indicated a lack of care in the process of manufacture. The average composition of the 17 samples examined was: Total arsenious oxid, 55.26 per cent; water-soluble arsenic compounds, 1.66 per cent; copper oxid, 28.81 per cent; and arsenious oxid combined with copper, 53.87 per cent.

Fifteen samples of arsenate of lead analyzed showed the following variations: Water from 39.06 to 68.16 per cent, arsenic oxid from 6.07 to 19.71 per cent, lead oxid from 21.13 to 40.08 per cent, soluble arsenic oxid from 0.05 to 0.28 per cent, and the soluble impurities other than arsenic oxid from 0.06 to 3.10 per cent. These results show that there has not been any decided improvement in the uniformity of the various brands.

Insecticide materials and spraying apparatus: Addresses of dealers and manufacturers, W. E. HINDS (*Alabama Col. Sta. Circ. 3, pp. 4*).—Address lists of some of the firms manufacturing or dealing in insecticide materials and apparatus are given.

Some insects injurious to forests.—Insect depredations in North American forests and practical methods of prevention and control, A. D. HOPKINS (*U. S. Dept. Agr., Bur. Ent. Bul. 58, pt. 5, pp. 57–101*).—The author here gives a summary of facts, conclusions, and estimates relating to the forest-insect problem as applied to North American conditions and calls attention to its importance in the future management of private and public forests.

In the first part of the paper (pp. 57–71) insect depredations in North American forests are considered, their character and extent being discussed at some length. The methods of prevention and control are then taken up (pp. 71–91), followed by general conclusions. It is stated to be evident that if the information now available is properly utilized in the future it will result in the prevention of an equivalent of at least 30 per cent of the estimated annual waste of forest resources that has been caused by insects within recent years. Methods by which this can be accomplished have been summarized as follows:

"The adoption or adjustment of certain requisite details in forest management, in lumbering and manufacturing operations, and in storing, transporting, and utilizing the products which, at the least expense, will bring about the necessary reduction of the injurious insect and unfavorable conditions for their future multiplication or destructive work.

"The adoption of policies of control, based upon expert technical knowledge or advice relating to the species, habits, life history, and natural enemies of the insects involved, and methods for their control, supplemented by expert knowledge or advice on the principles of technical and applied forestry in the proper management, care, and utilization of the forest and its resources and still further supplemented by practical knowledge and experience relating to local conditions and facilities favorable and unfavorable for successful application according to a given method or policy of control. . . .

"Utilization of so-called matured timber, and especially dense or pure stands of such timber, thus removing one of the favorable conditions for rapid deterioration through attacks by wood-boring insects or death through the attack of destructive bark-boring or defoliating insects.

"The utilization of a knowledge of the principles of natural control as a means of contributing to the efficiency of artificial control.

"Prompt recognition of the first evidences of the work or destructive outbreaks of the principal insect depredators, authentic identification of the species involved, and prompt action in adopting the proper method or methods of control for the prevention of losses."

Attention is called to the fact that it is useless to attempt the extermination of an insect enemy of the forest or its products. It is only necessary to reduce and weaken its forces at least 75 per cent, so that it can not continue an aggressive invasion, but must occupy a defensive position against its own enemies and become dependent upon favorable conditions resulting from avoidable negligence and mismanagement by the owners of the forests and the manufacturers of forest products.

An extensive list of publications relating to forest insects and to forest statistics is appended.

Some insects injurious to forests.—The southern pine sawyer, J. L. WEBB (*U. S. Dept. Agr., Bur. Ent. Bul. 58, pt. 4, pp. 41–56, figs. 12*).—An account of *Monohammus titillator*, its injury and remedial measures based on investigations conducted in Mississippi, Louisiana, and Arkansas.

So far as known this species attacks only pine trees, of which it apparently attacks all species within its range of distribution, when felled or injured. The storms of 1906, 1907, and 1908 furnished conditions favorable to this pest, and it is estimated that in the storms of 1907 and 1908, 2,180,800,000 ft. of timber was blown down, practically all of which was damaged by the sawyer. In the vicinity of Baxterville, Miss., where most of the author's investigations were carried on, from 75 to 90 per cent of the trees felled during the storm of April 24, 1908, were infested by the sawyer at the time of the visit of July 6. The damage to each log infested is the work of the larvæ or grubs which mine in and through the sapwood and even penetrate the heartwood, making large unsightly holes which cause the lumber made from this portion of the log to be thrown into the very lowest grade. Approximately 25 per cent of the lumber in each log infested by the sawyer is seriously damaged.

Technical descriptions are given of the 4 stages in the life of the sawyer, followed by an account of its seasonal history and habits. In southern Mississippi the egg-laying periods last from about the first of March to the middle of October. Preparatory to laying the eggs the female digs with her mandibles quite a conspicuous egg pit in the bark. The eggs are deposited in a circle around the bottom of the egg pit, as many as 9 eggs having been found deposited through a single pit opening. The larvæ hatch out in about 5 days and begin feeding upon the soft inner bark. They soon work their way through it, but do not enter the wood until they have attained considerable growth. Previous to pupation the larva extends the gallery into the sapwood until the heartwood is reached. It is probable that while the larval period may last for several months the pupal period is not longer than 2 or 3 weeks. The length of time occupied in passing from the egg to the adult stage varies greatly in different individuals. A few adults emerge in the fall but the greater number pass the winter in the larval stage.

Larvæ of the coleopterous family Trogositidæ, the larva of an elaterid beetle of the genus Alaus, and a parasite (*Bracon* [*Melanobracon*] *webbi*), here described by H. L. Viereck as new to science, are mentioned as natural enemies. None of these, however, has been powerful enough to thin appreciably the ranks of the sawyer.

Remedies considered under the headings fire, scoring, placing logs in water, and barking the logs are summarized as follows: "If possible saw all storm-felled trunks into logs and place the logs in water before the larvæ enter the wood, or within 40 days after the eggs are laid. If it is impossible to place the logs in water, they should be barked within 40 days after the first egg pits are observed in the bark."

A complete bibliography consisting of 20 titles is appended.

Insect carriers of typhoid fever, W. F. Dutton (*Jour. Amer. Med. Assoc., 53 (1909), No. 16, pp. 1248–1252, figs. 7*).—A brief account is given of the insects that are agents in the transmission of typhoid fever. The author considers the study of entomology and its relation to disease to offer one of the most prolific and promising fields in preventive medicine. A list of some of the more important works upon the subject is appended to the account.

Myiasis intestinalis due to infection with 3 species of dipterous larvæ, E. F. McCampbell and H. J. Corper (*Jour. Amer. Med. Assoc., 53 (1909), No. 15, pp. 1160–1162, fig. 1*).—*Anthomyia canicularis*, *Musca domestica*, and *Eristalis tenax* are the 3 species that were implicated.

Bee keeping [in Ireland] (*Dept. Agr. and Tech. Instr. Ireland, Agr. Statis. 1908, pp. XX, 140, 141*).—According to the returns received there appears to have been a decrease of 31.6 per cent in the quantity of honey produced in 1907 from that of the preceding year, as compared with an increase in 1906 of 0.6

per cent over 1905. The quantity of honey produced in 1908 was 322,160 lbs., of which 251,293 lbs. were produced in hives having movable combs. There were 2,387 lbs. of wax manufactured in 1907, of which 1,794 were from hives having movable combs.

Bee-keeping statistics are given (pp. 140, 141) showing by counties and provinces the number of stocks at various dates in 1907 and 1908, with the quantity of honey produced and wax manufactured in 1907.

Apiculture in the colonies, P. MARCHAL (*Agr. Prat. Pays Chauds, 9 (1909), No. 78, pp. 179–188*).—A brief report on apiculture in the French colonies.

FOODS—HUMAN NUTRITION.

[Pure food topics], E. F. LADD and EMILY E. MAY (*North Dakota Sta. Spec. Buls. 12, pp. 14; 13, pp. 16; 14, pp. 17–45; 15, pp. 47–62; 16, pp. 63–78; 17, pp. 79–88; 18, pp. 89–104*).—These bulletins discuss a variety of topics connected with the state pure food law and its application and report analytical data.

The principal subjects included are the following: Analyses of waters and a list of beverages registered under the state law; the results of the examination of drugs; a discussion of the use of food preservatives based on replies received from 171 North Dakota physicians in reponse to a circular letter of inquiry; data regarding the examination of ice creams and nonalcoholic beverages; the results of water analyses and analyses of whiskies and the results of the examination of a number of miscellaneous food materials, together with a discussion of a drug called "coca-bola;" the text of the model food law bill presented at the Denver convention of the Association of State and National Dairy Departments, by E. F. Ladd; and analytical data regarding a so-called tonic germicide (oxy-tonic), and the results of the analyses of a number of samples of drugs, miscellaneous foods, and sugar beets, together with data regarding the composition of numerous stock remedies.

The stock remedies were found to consist of such drugs as crude petroleum oil and ammonia, gas drip, tincture of iodin, and potassium hydroxid and air slaked lime. The ingredients would cost 2 to 5 cts. per bottle, it is stated, though the selling price of the goods was $1 per bottle. "As the result of our examination of the various products which have been submitted, we would say that they did not possess the virtue which has been claimed for them; that the sale of these products at the prices claimed is exorbitant; that the farmer who purchases them will be, to a considerable extent, defrauded; and that some of the products are practically nothing more than waste products from petroleum refineries or from the manufacture of coal gas."

In addition to the topics enumerated, a number of the bulletins contain short notes on a variety of special subjects connected with pure food work and sanitation.

[State beverage and sanitary inspection laws], E. F. LADD (*North Dakota Sta. Spec. Bul. 11, pp. 14*).—The text of the state pure beverage law and the sanitary inspection law, each of which was approved March 15, 1909, is given, together with rulings and discussions as to these laws.

Law bulletin (*Penn. Dept. Agr. Bul. 180, pp. 68*).—The text of the law establishing a department of agriculture in Pennsylvania, the various acts of assembly committed to the dairy and food division for enforcement, and a brief digest of numerous decisions of courts relating to the aforesaid laws, rules, and regulations are included in this bulletin.

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 103, pp. 2–4; 106–108, pp. 9–15; 110, pp. 17, 18*).—The subjects included are the adulteration of eggs and the misbranding of cane sirup, Vermont or maple sugar, preserves,

and sirup. In the case of eggs the special topic considered was the presence of putrid and decomposed animal matter.

Notice of judgment (*U. S. Dept. Agr., Notice of Judgment 111, pp. 2*).—This has to do with the misbranding of catsup as to the amount of benzoate of soda present.

Administrative measures for the protection of the food supply produced in this country, J. McPhail (*Jour. Roy. Inst. Pub. Health, 17 (1909), No. 11, pp. 673–676*).—Conditions existing in Great Britain are discussed and remedies suggested.

Administrative measures for the protection of the food supply, W. G. Savage (*Jour. Roy. Inst. Pub. Health, 17 (1909), No. 11, pp. 677–683*).—A summary of data and discussion of conditions in Great Britain.

New meat inspection regulations in Hungary in comparison with German regulations, W. Meyer (*Ztschr. Fleisch. u. Milchyg., 20 (1909), No. 2, pp. 35–41*).—A critical discussion.

Meat inspection in a small town 300 years ago, Schmutzer (*Ztschr. Fleisch u. Milchyg., 20 (1909), No. 2, pp. 41–46*).—The historical data summarized have to do with Waldheim, a town in Saxony.

Report of the department of food and drugs, State Board of Health, for September, 1909, H. E. Barnard (*Mo. Bul. Ind. Bd. Health, 12 (1909), No. 9, pp. 118–120*).—Brief statements are made regarding the examination of 232 samples of dairy products, ice cream, flavoring extracts, summer drinks, etc. Of these 184 were declared to be legal. Some data are also given regarding the inspection of dairies, grocery stores, markets, etc.

A note on the constituents of meat extract, R. Krimberg (*Ber. Deut. Chem. Gesell., 42 (1909), No. 14, pp. 3878–3880*).—A controversial article.

Cotton-seed products, J. L. Brodé (*Daily Cons. and Trade Rpts.* [*U. S.*], *1909, No. 3645, pp. 1–5*).—The author describes the sardine industry of Norway and discusses the efforts which are being made to induce packers to use a high grade of cotton-seed oil in preparing fish for the market.

The odor of sea fish, T. Panzer (*Ztschr. Angew. Chem., 22 (1909), No. 40, p. 1931*).—According to the author the peculiar odor sometimes noted in fish that are packed in ice is due to the presence of traces of indol.

Meat substitutes, E. Salkowski (*Biochem. Ztschr., 19 (1909), No. 1–2, pp. 83–131*).—In the experiments reported albumin obtained from meat used in the manufacture of meat extract, albumin from blood and from horse beans, a wheat gluten preparation, and bean meal were studied. The author reaches the conclusion that there seems little likelihood that suitable protein material of vegetable origin can be prepared as a palatable and economical substitute for meat.

[Milling and baking tests], J. T. Willard (*Kansas Sta. Rpt. 1908, pp. XLIV, XLV*).—The character and extent of milling and baking tests with Kansas wheats at the station are briefly outlined. With a view to insuring greater accuracy a special baking pan was designed for use in this work.

The effect of germination on the baking quality of wheat was studied by allowing samples to remain for different lengths of time under conditions suitable for germination, then drying, grinding, and subjecting the resulting flours to baking tests and chemical examination. In all cases a deleterious effect was observed on the milling qualities. When the wheat was kept under germination conditions no longer than 3 days the baking quality was little affected, but if the period was longer than this, the flour became progressively weaker, resembling that from soft wheat. It was found that adding to the wheat all the water which it would absorb and allowing it to remain moist for varying lengths of time at a low temperature affected but little the baking quality of

flour ground from it. If, however, the moist wheat was heated, the baking quality was markedly lowered.

Studies on bread fermentation, A. J. J. VANDEVELDE (*Bul. Soc. Chim. Belg.*, *23* (*1909*), *No. 6, pp. 267-283*).—The fermentation of flours differing as to gluten content and also the effect of heat on fermentation were studied by the author, and he concludes that his results are in harmony with the view that the action of gluten is largely a mechanical one, any modifications which the gluten undergoes being slight.

Dirty bread, M. YOUNG (*Ann. Rpt. Med. Off. Health Marylebone* [*1908*]; *rev. in Pub. Health* [*London*], *23* (*1909*), *No. 2, p. 60*).—Attention is called to the probable contamination of bread when it is carried through the streets for delivery without special protection, and some information is given regarding the cost of wrapping bread so as to insure protection. In the experience of a London baker the cost of paper and string for this purpose was about 8 cts. per 100 2-lb. loaves.

The bread problem at Budapest (*Lancet* [*London*], *1909, II, No. 19, pp. 1383, 1384*).—The municipal bakery at Budapest, which is designed especially to produce clean bread under sanitary conditions at a reasonable price, is described. It is said that the enterprise is successful. Some information is also given regarding municipal bread baking in Paris.

The tomato, J. M. ALBAHARY (*Ann. Falsif.*, *2* (*1909*), *No. 5, pp. 140–144; abs. in Chem. Ztg.*, *33* (*1909*), *No. 106, Repert., p. 457*).—Analyses are reported. The author notes that the content of oxalic acid is less than usually claimed and therefore there is no reason for the opinion often expressed that the tomato should not be freely used as food.

The composition of Antigua and St. Kitt's molasses, F. WATTS and H. A. TEMPANY (*West Indian Bul.*, *10* (*1909*), *No. 1, pp. 29–34*).—Analyses are reported and discussed.

According to the authors' summary, the amount of sucrose present in St. Kitt's molasses is notably small when compared with that from Antigua, no other very marked or regular differences being noted in the composition of the different samples. As regards taste, smell, color, and appearance, "it was found that, whereas the Antigua samples, in the majority of instances, were possessed of a pleasant fruity smell, and in flavor were sweet, fruity, and palatable, the St. Kitt's samples were generally rough and harsh."

The preservation of maple sirup, G. E. STONE (*Massachusetts Sta. Rpt. 1909, pt. 1, p. 45*).—The author states that he has obtained good results in sterilizing maple sirup to prevent fermentation and loss of flavor. There is much difference in the specific gravity of sirups, some grades spoiling more quickly than others. Fermentation is evidently due, according to the author, to contamination with micro-organisms, and by sterilization the freshness and much of the flavor of the sirup can be retained. The ordinary blue molds, *Penicillium glaucum* and *Aspergillus glaucus* are occasionally found growing in maple sirup. *P. brevicaule* was also found.

Fermented vinegar and vinegar essence, K. B. LEHMANN (*Ztschr. Öffentl. Chem.*, *15* (*1909*), *No. 15, pp. 288–292*).—In an address delivered before the Association of German Food Manufacturers and Dealers the author discusses problems concerned with the vinegar industry.

The bactericidal action of wine and alcoholic drinks, MUNIER and F. SEILER (*Schweiz. Wchnschr. Chem. u. Pharm.*, *47* (*1909*), *No. 44, pp. 683–687*).—Experimental data are reported and discussed.

Malt extracts (*Brit. Med. Jour.*, *1909, No. 2551, pp. 1477, 1478*).—Data are reported regarding the composition of a number of proprietary malt extracts.

Another advance in commodity prices (*Bradstreet's, 37 (1909), No. 1637, pp. 729, 730*).—Data are summarized regarding the comparative prices in the United States of 106 commodities including foodstuffs, fuels, and other materials, the period covered being 1896–1909.

Wholesale prices of food, Rhode Island, 1892–1909 (*Bd. Trade Jour. [Providence], 21 (1909), No. 11, pp. 559, 560*).—Of 47 articles considered 41 show increases in price over the average for the entire 18 years. The 6 articles which show lower average prices than the average for the period covered are evaporated apples, cabbage, canned corn, prunes, rice, and turnips.

"The 12 articles other than meats which show the greatest percentage of increase in prices in 1909 over the average prices for the 18 years considered were: Pie apples, 61.6; potatoes, 51.1; cheese, 44.6; beans, yellow eye, 43.4; flour, buckwheat, 16.1; flour, wheat, 34.9; lard, pure leaf, 33.0; lard, compound, 31.7; meal, corn bolted, 30.8; butter, tub, 29.0; eggs, domestic, 27.1; and butter, print, 21.1.

"Classified by groups, the average increase in percentage, for each group, gives an approximate idea of the comparative increases for various lines of food products. Cereals show an average increase of 24.6; dairy products, 25.9; fish, 18.1; fruits, 18.7; meats, 19.5; vegetables, 10.8; and miscellaneous, 7.4 per cent."

British food prices, J. L. Griffiths (*Daily Cons. and Trade Rpts. [U. S.], 1909, No. 3626, p. 13*).—A summary of data regarding the prices of food in Great Britain for 1906, 1907, and 1908. In general, an advance in prices is noticeable.

Retail prices and cost of living [in Marseille], Rule (*Diplo. and Cons. Rpts. [London], Ann. Ser., 1909, No. 4270, p. 11*).—Some statistics are given regarding the cost of food and other living expenses.

The cost of living (*Economist, 69 (1909), No. 3453, pp., 865, 866*).—The increased cost of living in Vienna is considered and some statistical data are given.

[Nutrition investigations of the Solvay Institute], A. de Foville (*Écon. Franc., 37 (1909), II, No. 33, pp. 235–237*).—In an article on the International Statistical Institute of Paris information is summarized regarding the nutrition studies carried on by the Solvay Institute in the families of laboring men (E. S. R., 19, p. 562).

The sanitary officer's handbook of practical hygiene, C. F. Wanhill and W. W. O. Beveridge (*London, [1909]; rev. in Pub. Health [London], 23 (1909), No. 2, pp. 59, 60*).—It has been the authors' intention to provide a practical handbook on analytical chemistry and bacteriology for the use of military and civilian medical officers who have to carry on their work away from well equipped laboratories and libraries.

Methods are given for the chemical examination of water, sewage, air, foods, and beverages, and one chapter is devoted to the calculation of diets and contains a sample of a mess sheet.

[Army rations, training schools for bakers and cooks, and other nutrition topics], H. G. Sharpe (*Rpt. Commis. Gen. [U. S. Army], 1909, pp. 11–15*).—In this report information is summarized regarding rations for officers and civilian employees serving in the field, the new army ration, field trials with field ranges, ovens, and fireless cookers, the kitchen touring car, detachment mess car, and portable gas cooker for army use, and related topics.

Information is also given regarding the character and extent of the work of the army training schools for bakers and cooks.

Criteria and standards in infant feeding, T. G. Allen (*Jour. Amer. Med. Assoc., 51 (1908), No. 20, pp. 1687–1691*).—Infant feeding is discussed in relation to the proteid and energy quotients and it is suggested that these values be used as a basis for determining the food requirements of infants.

A convenient method for determining caloric values of formulas based on percentage feeding of infants, H. I. Bowditch (*Jour. Amer. Med. Assoc., 53 (1909), No. 16, pp. 1265, 1266*).—Problems in infant feeding are discussed from two standpoints, namely, the percentage composition of food materials and the energy value of the food. The author believes that the two methods should be combined and has prepared a table which in his opinion facilitates the calculations involved.

Heubner's system of infant feeding expressed in calories and energy units, E. Lackner (*Jour. Amer. Med. Assoc., 53 (1909), No. 16, pp. 1267–1269*).—In this paper the author discusses the food requirements of infants expressed in calories per kilogram of body weight, and other topics concerned with infant feeding. The paper is followed by a discussion.

Children in health and disease, D. Forsyth (*London [1909]; rev. in Pub. Health [London], 23 (1909), No. 2, p. 59*).—This volume deals with the physiology of school children, the hygiene and medical aspects of schools and school life, medical inspection and supervision of scholars, infantile mortality, the proper feeding and management of infants, diseases of childhood and their diagnosis and treatment, and similar topics.

The macroscopic and microscopic appearances of stomach contents, J. W. Weinstein (*Jour. Amer. Med. Assoc., 53 (1909), No. 21, pp. 1710–1716, figs. 8*).—The author presents data regarding the appearance of the stomach contents withdrawn at intervals after test meals which are reported in comparison with similar information for pathological conditions. The methods of staining samples for microscopic examination are outlined.

A metabolism experiment with special reference to the origin of uric acid, R. H. A. Plimmer, M. Dick and C. C. Lieb (*Jour. Physiol., 39 (1909), No. 2, pp. 98–117, dgm. 1*).—A meat diet, a purin-free diet, and a purin-rich diet were studied. According to the authors, although their results agree with those of previous investigators that the output of uric acid is greater on a meat or mixed diet than on what is ordinarily termed a purin-free diet, yet they do not support the views which are commonly advanced regarding the origin of uric acid in the urine.

"It is generally assumed that all the purins, whether endogenous or exogenous, undergo practically complete conversion into uric acid, and that one-half of this was destroyed by oxidation whilst the other half appeared as uric acid. The fact that in our experiments the purin base output remained minimal and was not affected by any changes in the diet confirms the idea that these substances undergo total conversion in the body, but our results do not bear out the further statement that one-half of the converted purins appears in the urine as uric acid."

This was shown by the fact that the administration of guanin and xanthin gave practically no rise in the uric acid output; further, while the administration of very large quantities of purins in the form of herring roe increased the output of uric acid, the excess corresponded to only about one-tenth of the total purins ingested. Meat extract caused a large increase in the excretion of uric acid, more than half of the purins present in it being converted into uric acid. "On the above view, this could only be explained if it were assumed that with this substance for some reason or other uricolysis or destruction of uric acid had diminished.

"There is thus scarcely any relation between purins and uric acid in our subject. Purins arising from the destruction of the nuclei of the leucocytes are therefore probably not the precursors of the uric acid in the urine. . . . What then is the relationship between leucocytes and uric acid? In all living animals foodstuffs undergo metabolism; in mammals the end product is urea, in birds,

reptiles and fishes it is urea and uric acid, in many invertebrates it is uric acid. In leucocytes, as invertebrates, the end product of metabolism is most probably uric acid. We are therefore inclined to conclude that the uric acid in the urine is an expression of their metabolism. . . .

"Further work will be necessary before the view here put forward can be regarded as established, but our results certainly throw considerable doubt on the prevalent opinion that the purins of the food and of the tissues are the sole source of the uric acid in the urine."

Comparative physiology of purin metabolism, H. G. Wells (*Trans. Chicago Path. Soc., 7 (1909), No. 8, pp. 244–248; Jour. Amer. Med. Assoc., 53 (1909), No. 21, p. 1741*).—According to the investigations summarized, "the invertebrates are able to convert adenin into hypoxanthin and guanin into xanthin, showing the presence of the enzyms, adenase, and guanase, but the metabolism proceeds no farther. Passing upward in the scale of animal life to the birds and reptiles we find that nitrogen is excreted chiefly in the form of uric acid. Mammals form uric acid only from the purins and have the power of destroying some of the uric acid formed. The enzyms that destroy uric acid seem to be the last formed in development and are possessed by various mammals in varying degrees and in the same animal often show an uneven distribution in the various organs of the body. This uricolytic power is relatively weak in man." The paper is followed by a discussion.

The effect of work on the creatin content of muscle, T. G. Brown and E. P. Cathcart (*Bio-Chem. Jour., 4 (1909), No. 9, pp. 420–426*).—The general result of the series of experiments reported, according to the authors, is that, "with the circulation intact, stimulation of the muscles brings about a constant, although small, decrease in the amount of total creatinin (i. e., creatin + creatinin) extracted from the stimulated muscle." The experiments were made with small animals.

The distribution of fat, chlorids, phosphates, potassium, and iron in striated muscle, Maud L. Menten (*Univ. Toronto Studies, Physiol. Ser., 1908–9, No. 7, pp. 21, pl. 1; reprinted from Trans. Canad. Inst., 8 (1909), III, No. 18, pp. 403–422, pl. 1*).—The distribution of a number of the muscle constituents was studied microscopically by the use of stains which imparted characteristic colors to each. The data reported have to do chiefly with the microchemistry of muscle of Insecta and Crustacea.

ANIMAL PRODUCTION.

Report of the assistant animal husbandman, E. G. Ritzman (*Porto Rico Sta. Rpt. 1908, pp. 37–39*).—This report contains brief notes on the live stock industry in Porto Rico and methods of caring for different farm animals at the station.

The exportation of cattle from Porto Rico to the neighboring islands has gradually diminished, but the quality of the stock kept on the island has somewhat improved. In attempting to increase the size of the horses and mules some good results have been obtained by the importation of saddle-gaited and trotting-bred stallions. It costs less to keep horses and mules at the station than in the States. Two horses with very little exercise received 2 lbs. each of oats per day and 2 smaller ones received only 1 lb. per day, with Para grass for roughage. The mules, which are constantly worked, received 3 lbs. of oats daily in addition to the Para grass. Silage from Para grass has also been fed to the mules and cattle. When sprinkled with about 1 liter of cane molasses diluted with water it is eaten with relish, but without molasses they do not seem to care for it.

Suggestions are given for improving the native cattle by using pure bred imported stock. During the past year the station has obtained 5 ewes and 1 ram of African woolless sheep, with a view to encourage the production of mutton which is in great demand. Up to the present time they have not been troubled with insect pests or parasites and no indication of foot rot has been noticed during the rainy period as they are kept in a well-drained paddock with access to a dry shed. Goats are much more numerous on the island than sheep and at present furnish a large part of the meat, which is sold for mutton, as well as the milk for family use to the poorer classes. Berkshires are the only breed of pigs kept at the station. They keep in good health, are thrifty and vigorous, and appear to do well on the native grasses. They are also fed shorts, corn meal, and tankage.

Work in animal feeding, J. B. Lindsey and P. H. Smith (*Massachusetts Sta. Rpt. 1908, pt. 1, pp. 18–28*).—Results of investigations noted from other sources are given.

On the feeding value of dried by-products of the sugar beet, N. Hansson (*Meddel. Centralanst. Försöksv. Jordbruksomradet, No. 12; Fühling's Landw. Ztg., 58 (1909), No. 21, pp. 753–775, chart 1*).—The report gives a detailed account of experiments with cows, horses, and swine conducted during 1906–1909 at 6 different Swedish farms.

The group system worked out by Fjord was adopted in the conduct of the experiments, each group being as uniform as possible and containing 5 to 8 animals. The feeds compared were siloed beet pulp, fodder beets, dried sugar pulp (Steffen process), and dried molasses pulp. The experiments with milch cows were conducted partly during the winter and partly in summer time under soiling conditions. Both dried products proved well adapted as substitutes for fodder beets or siloed beet pulp for feeding milch cows. It was found that the feeding value of 1 kg. dry matter in fodder beets was about equal to 0.87 kg. dry matter in sugar pulp, 0.88 kg. dry matter in the siloed pulp, and 0.9 kg. dry matter in molasses pulp.

In the summer feeding experiments when the dried pulp was fed with soiling crops as substitutes for concentrates, like ground mixed grains, wheat bran, etc., the pulp had a somewhat lower value than the mixed grains, but a higher value than malt sprouts and "molasin" (peat molasses). Both kinds of dried pulp were eaten with great relish by the cows and no deleterious influence was found either in the quality of the products obtained or the well-being of the cows. The results indicated, however, that the feeds high in sugar have a tendency to lower the fat content of the milk by a few hundredths of 1 per cent.

Fed to horses the dried sugar pulp was also eaten with relish and was equal to the same weight of a mixed grain ration. It proved less desirable as a feed for swine and was not especially relished by them. The best results with swine were obtained when it was fed at an early stage of development prior to the fattening period proper as a substitute for root crops at a rate of not over 1 lb. per 100 lbs. live weight. The quality of the pork produced was good on the pulp feeding, but this increased the loss in dressed weight by 2.42 per cent. Even under the most favorable conditions it may therefore be assumed that at least 1.3 to 1.4 kg. of dried sugar pulp are required to take the place of 1 kg. of grain in feeding swine.

The average analyses of the main feeds used are shown in the following table:

Chemical composition of various feeding stuffs.

Feeding stuff.	Moisture.	Protein.	Albuminoids.	Ether extract.	Carbohydrates.	Sugar.	Cellulose.	Ash.
	Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
Siloed beet pulp	88.53	1.28	1.10	0.20	8.75	....	....	1.30
Dried molasses beet pulp	12.44	7.24	5.51	.35	74.27	....	13.17	4.70
Dried sugar beet pulp	11.84	6.11	5.13	.47	78.12	26.90	11.89	3.46
Molasses feed	19.20	12.00	7.40	1.00	62.60	....	....	5.20
"Molasin"	24.60	8.40	[a] .70	....	58.60	....	....	8.40

[a] Peat nitrogen.

Soya bean and products (*Spec. Cons. Rpts.* [*U. S.*], *40* (*1909*), *pp. 35*).—This report contains statistical information gleaned from the United States consuls from different parts of the world concerning the production and use of the soy bean, with special reference to soy bean products which are coming into competition with the products of cotton seed. The methods of preparing soy bean oil and cake are described. Analyses of the cake are given and tests of its value for feeding cattle are reported.

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 102, pp. 1, 2; 104–105, pp. 4–9; 109, pp. 15, 16*).—These notices relate to the misbranding of distiller's dried grains and the adulteration and misbranding of stock feeds, cereals, and cotton-seed hulls.

Winter steer feeding, 1908–9, J. H. Skinner and W. A. Cochel (*Indiana Sta. Bul. 136, pp. 3–48*).—This bulletin reports results in steer feeding in continuation of experiments previously reported (E. S. R., 20, pp. 969, 971), and which were conducted under conditions which confront the practical stock feeder. The animals used were grade Angus. In all cases a profit was secured without taking into account the increased fertility which resulted from the large accumulation of manure in the feed lots. Cotton-seed meal was estimated at $28, clover at $8, and corn silage at $2.50 per ton, and corn at its market value at the time it was fed, which varied from 52 to 67 cts. per bushel.

In the first experiment 20 calves, 10 yearling steers, and 10 two-year-old steers were fed 6 months to study the influence of age on profit in fattening. The ration consisted of shelled corn, cotton-seed meal, and clover hay. The consumption of hay decreased according to the age of the cattle while the consumption of grain increased. The amount of corn consumed by both calves and yearlings shows a consistent increase throughout the entire period, but with the two-year-old cattle the grain consumption increased during the first 4 months, after which there was a gradual decrease in spite of the fact that the hay was decreased at the same time. This indicates that the maximum consumption of grain by two-year-old cattle occurs during the fourth month after the beginning of the feeding period. The yearlings made a slightly more rapid gain than the two-year-olds. The results, shown in the following table, were very similar to those reported previously and show that the older the cattle when started into the feed lot the greater will be the amount of feed required to produce a pound of beef, so that the margin between buying and selling prices of calves need not be so great as on older cattle in order to insure a profit from feeding.

Influence of age in fattening steers during a period of six months.

	Average initial weight.	Average daily gain per steer.	Dry matter per pound gain.	Cost per pound gain.	Initial value per cwt.	Value per cwt. in feed lots.	Profit per steer.
	Lbs.	*Lbs.*	*Lbs.*	*Cts.*			
Calves	457.7	2.00	7.74	7.72	$4.75	$6.75	$6.73
Yearlings	684.6	2.33	9.26	9.43	4.40	6.90	10.81
Two-year-olds	966.0	2.27	11.52	11.71	4.55	7.10	12.80

The second experiment was a study on the relative value of silage, cotton-seed meal and clover hay as supplements to corn in fattening two-year-old steers. Forty steers weighing about 940 lbs. each, and with an initial value of $4.55 per hundredweight, were divided into lots of 10 each. The greatest consumption of corn was in the lot receiving only clover hay as a supplement. If the experiment had closed a month earlier, the amount of feed and dry matter as well as the cost in producing gains would have been less in each case. Other data are given in the following table:

Results of feeding supplements to corn with two-year-old steers during a period of six months.

Supplementary ration.	Average daily gain per steer.	Cost per pound of gain.	Dry matter fed per pound of gain.	Value of cattle in feed lot per cwt.	Profit per steer.
	Pounds.	*Cents.*	*Pounds.*		
Cotton-seed meal; clover hay	2.27	11.44	11.52	$6.75	$12.79
Cotton-seed meal; corn silage	2.58	9.39	9.98	6.90	21.51
Cotton-seed meal; clover hay; corn silage	2.33	10.93	11.34	6.80	15.80
Clover hay	1.89	12.35	13.50	6.55	9.89

In an experiment in short versus long feeding, 25 two-year-old steers of a higher grade than those in the preceding experiment were used. The ration consisted of shelled corn, cotton-seed meal, and clover hay. The method of feeding was such that the 15 short-fed cattle received a more concentrated ration than the 10 in the long-fed lot. There was a gradual increase in the amount of corn consumed by the short-fed cattle. The maximum amount of corn consumed by the long-fed cattle was reached during the fourth month of their feeding period, which lasted 180 days. Other data on this experiment are given in the following table:

Long versus short feeding periods for two-year-old steers.

	Average initial weight.	Average daily gain per pound.	Cost of gain per pound.	Dry matter fed per pound of gain.	Initial value per cwt.	Value of cattle in feed lot.	Profit per steer.
	Pounds.	*Pounds.*	*Cents.*	*Pounds.*			
Long-fed (first 120 days)	966	2.27	10.73	11.60	$4.55	$6.10	$9.65
Long-fed (entire 180 days)	966	2.27	11.44	11.52	4.55	6.75	12.79
Short-fed (120 days	1,140	2.67	11.19	11.15	4.75	6.45	12.54

Other conclusions of the author are as follows:

"Two-year-old cattle placed in the feed lot in equal condition and given a full feed attain a higher finish during a six months' feeding than either yearlings or calves.

"The margin between buying and selling prices necessary to insure a profit increases with the age of the cattle. . . .

"The amount of pork purchased from the droppings increased with the age of the cattle. . . .

"The profit per dollar invested in cattle, hogs, and feeds for 6 months was 12.5 cts. in feeding calves, 13.7 cts. in feeding yearlings, and 12.5 cts. in feeding two-year-olds. . . .

"A greater margin is necessary to insure a profit from feeding a period of 180 days than from one of 120 days.

"The margin necessary to prevent loss on short-fed cattle was $1.41 per hundred; on long-fed cattle, $2.07 per hundred."

"The addition of corn silage to a ration of shelled corn, cotton-seed meal, and clover hay resulted in a more rapid and cheaper gain and a higher finish on the cattle."

Dairy by-products as supplements to corn for fattening hogs, J. H. SKINNER and W. A. COCHEL (*Indiana Sta. Bul. 137, pp. 51–72*).—This is a continuation of a series of experiments undertaken to determine the value of various supplements to corn in pork production (E. S. R., 17, p. 387; 20, p. 369). Its object was to determine the value of skim milk and buttermilk as supplements, and to compare dairy by-products with home-grown and commercial nitrogenous concentrates.

The feeds used were shelled corn, corn meal, skim milk, buttermilk, middlings, tankage, linseed oil meal, soy bean meal and rape. In 1906, 5 pigs weighing 68 lbs. each, kept on a ration of shelled corn and skim milk for 90 days, made an average daily gain of 1.22 lbs. per head and required 2.53 lbs. of shelled corn for each pound of gain. Another lot on shelled corn and rape pasture made an average daily gain of 0.81 lb. per head and required 3.97 lbs. corn for each pound of gain. The experiment was repeated in 1907 with 6 pigs in each lot, and fed for 50 days. Those receiving the skim milk made an average daily gain of 1.57 lbs. per head and required 3.08 lbs. of shelled corn in addition to make 1 lb. of gain. The lot which was on rape pasture made a corresponding gain of 0.97 lb. per head and required 4.5 lbs. of shelled corn for each pound of gain.

In comparing supplements to corn meal 5 lots of 5 pigs each, weighing about 113 lbs. each, were fed for 60 days. The average daily gains per head were as follows: On corn meal and linseed meal 8:1 1.75 lbs. at a cost of 3.63 cts. per pound; on corn meal and soy bean meal 7:1 1.82 lbs. at a cost of 3.57 cts. per pound; on corn meal and tankage 15:1 1.83 lbs. at a cost of 3.71 cts. per pound; on corn meal and middlings 1:1 1.97 lbs. at a cost of 3.88 cts. per pound; and on corn meal and skim milk 1:1.5 2.02 lbs. at a cost of 3.56 cts. per pound. In calculating the cost the different feeds were estimated as follows: Corn meal $18, linseed meal $30, soy bean meal $30, tankage $40, and middlings $25 per ton, and skim milk 20 cts. per hundredweight. In the lot where corn meal and tankage were fed, there was a greater amount of corn used in proportion to other feeds than in any other lot, and where corn meal and middlings were used, the proportion of corn was smallest. The smallest amount of dry matter necessary to produce a pound of pork was in the lot fed on corn meal and skim milk, and the greatest amount was in the lot fed corn meal and tankage.

In another test of supplements to corn, 3 lots of 6 pigs, weighing about 105 lbs., each were fed for 60 days and made the following average daily gains per head: Corn meal and skim milk 1:1.5 1.76 lbs. at a cost of 4.6 cts. per pound; corn and linseed meals 8:1 0.98 lbs. at a cost of 6.36 cts. per pound; and corn and soy bean meals 8:1 0.9 lb. at a cost of 6.16 cts. per pound. The prices of

feeds used in this experiment were: 70 cts. per bushel for corn, with an addition of 10 cts. per hundred pounds for grinding; 25 cts. per hundred pounds for skim milk; and $30 per ton for both linseed and soy bean meals.

Three lots of 10 hogs each were fed 30 days to compare shelled corn, shelled corn and tankage, and shelled corn and buttermilk for fattening hogs, weighing about 200 lbs. at the beginning of the experiment. On the shelled corn ration the average daily gain was 1.40 lbs. per head at a cost of 4.74 cts. per pound; on the shelled corn and tankage ration 1.73 lbs. per head at a cost of 4.25 cts. per pound; and on the shelled corn and buttermilk 2.20 lbs. per head at a cost of 4.09 cts. per pound. The tankage was estimated at $2 and the buttermilk at 20 cts. per hundredweight and the corn at 60 cts. per bushel. If the corn had been estimated at 40 cts. per bushel there would have been little difference in the costs of gains in the different lots.

The development of the chick, F. R. Lillie (*New York, 1908, pp. XI+472, pls. 7, figs. 241*).—This book is intended as a text-book for the study of the embryology and development of the chick, and at the same time serve as an introduction to the study of embryology in general.

The introduction contains a résumé of the cell theory and the general character of the ovum and spermatozoön. Part 1 treats of the anatomy and physiology of the ovary, the structure and chemical composition of the egg, and the changes in the egg during the first 3 days of incubation. The matter concerning the later development is classified by the organs concerned and constitutes part 2.

Experimental biology, H. Przibram (*Verhandl. K. K. Zool. Bot. Gesell. Wien, 58 (1908), No. 6–7, pp. (171)–(180); abs. in Jour. Roy. Micros. Soc. [London], 1909, No. 5, p. 563*).—This is a lecture in which many interesting cases are cited to show the value of experimental methods in studying the fundamental principles of plant and animal life.

The development of the animal egg by means of chemical stimuli, J. Loeb (*Die Chemische Entwicklungserregung des Tierischen Eies (Künstliche Parthenogenese). Berlin, 1909, pp. XXIV+259, figs. 56; rev. in Nature [London], 81 (1909), No. 2085, p. 459*).—This is an attempt to interpret the process of fertilization of the ovum in terms of chemistry and physics, and is based largely on the researches of the author.

The introduction contains a concise résumé of investigations in artificial parthenogenesis. The development of the egg is considered to be a chemical process depending mainly on oxidation, in which there is a synthesis of nuclear material from the cytoplasm. The formation of the membrane is regarded as the most important factor of fertilization. It has also a deleterious effect which must be counteracted in some way. In natural fertilization of the egg the formation of the membrane is brought about by a lysin carried by the spermatozoön, which also brings a second substance which serves to counteract the evil effects of membrane formation.

Note on the chemical mechanics of cell division, T. B. Robertson (*Arch. Entwickl. Mech. Organ., 27 (1909), No. 1, pp. 29–34*).—The author points out that cell division can not be brought about through an increase of surface tension at the equator, as suggested by Bütschli, as an increase of surface tension at that point would induce a streaming of material toward the equator and the formation of a flattened disk instead of cellular division.

Further conclusions of the author are as follows:

"If a thread moistened with a base, or a sufficiently concentrated solution of the base, be laid across a diameter of a drop of oil containing a trace of fatty acid, the drop undergoes division along that diameter.

"If the thread be merely smeared with a soap of the base, even in the presence of considerable excess of fatty acid, the same result is achieved; the effect is therefore due to soap formation and not to hydroxyl ions.

"The mechanical division of the droplets is brought about by violent streaming movements from the equator of the drop toward the poles, due to the lowering of the surface tension in the equatorial region brought about by the soap. It is pointed out that these facts confirm Loeb's hypothesis that cell division is brought about through the mechanical agency of streaming phenomena.

"It is suggested that the equatorial lowering of surface tension and consequent streaming phenomena which lead to cell division are brought about by cholin or soaps of cholin liberated in the cell through the splitting of lecithin in nuclein synthesis."

Recent work on the determination of sex, L. DONCASTER (*Sci. Prog. Twentieth Cent., 4 (1909), No. 13, pp. 90–104*).—A sketch of recent work on the evidence concerning the presence of a sex determinant in the germ cells comparable in nature with the Mendelian unit, from which the author concludes "that the probabilities are overwhelmingly in favor of the idea that the determination of sex is not consequent on the accidental preponderance of one or other of two nicely balanced tendencies, but is due to fixed and unalterable characters inherent in the germ cells." There are numerous references to the literature on the subject.

The making of species, D. DEWAR and F. FINN (*London and New York, 1909, pp. XIX+400, pls. 16*).—This book attempts to present in simple language biological problems such as the natural selection theory, hybridism, fertility of hybrids, Mendelian inheritance, and other factors concerned in the evolution of species in nature and under the influence of man. Throughout the book there is a strong protest against the views of the post-Darwinians. It is pointed out that bionomics, or the science of living animals, occupies too small a place in English scientific literature. In a discussion as to what species will survive in the future, it is stated that the making of species, their survival, and the future of biology lie largely in the hands of the practical breeder.

On the colors of horses, zebras, and tapirs, R. I. POCOCK (*Ann. and Mag. Nat. Hist. [London], 8. ser., 4 (1909), No. 23, pp. 404–415*).—This contains a discussion of the nomenclature of colors and color patterns in Equidæ and other large mammals. Various theories which account for the causation and inheritance of albinism, dappling, and the zebroid pattern are reviewed. The author thinks that the Equidæ are descended from dark colored animals patterned with white spots, running into longitudinal lines originally and in a late state of evolution becoming arranged in transverse bars over the neck and body. If this theory is true, then the white spots of dapple-grey horses represent phylogenetically the white spots of a tapiroid progenitor, a stage antecedent to the vertical zebroid bands hitherto regarded as the most primitive pattern extant in the Equidæ.

The Scandinavian origin of the hornless cattle of the British Isles, J. WILSON (*Sci. Proc. Roy. Dublin Soc., n. ser., 12 (1909), No. 15, pp. 145–164, figs. 6*).—It is the purpose of this paper to show that the existing and extinct British breeds of hornless cattle may all be traced back to a Scandinavian origin, which is contrary to the prevalent opinion that most of the British hornless breeds of cattle have originated independently. The lines of evidence presented are that these hornless breeds were originally of similar character, and therefore presumably of common origin; that their arrival in the British Islands coincided with that of the Norsemen; that cattle of similar character were taken to other parts of Europe with which the Norsemen were associated; and that traces at

least of cattle of similar character are to be found in Scandinavia. The author admits, however, that this theory does not account for the hornless wild white herds, nor the hornless cattle skulls found in the Roman fort at Newstead.

Cattle breeding in Holland, ZWAENEPOEL and COPPENS (*Ann. Méd. Vét., 58 (1909), Nos. 2, pp. 80–88, fig. 1; 3, pp. 151–156, pls. 2; 4, pp. 196–212; 5, pp. 253–262*).—This series of articles contains data on cattle, dairy products, descriptions and measurements of the breed, and methods of registering cattle, in the Holland herd book.

Export of Malagasy cattle to France (*Bul. Off. Colon. [France], 2 (1909), No. 22, pp. 701–703*).—An account of the possibilities which the Island of Madagascar offers as a source of meat supply for France. The colony contains nearly 4,000,000 head of zebus, which is more than enough for home consumption. A small shipment has recently been made to Marseille, and if successful a company will be organized to export cattle on a large scale.

Breeding Merino sheep in France, A. H. THOMSON (*Breeder's Gaz., 56 (1909), No. 18, pp. 887, 888*).—This is a brief account of the modifications of the Merino breed, chiefly in the Toissonnaise and Chatillonais districts where a type of Merino has been evolved which is distinguished from the others by its larger size, more regular conformation, and greater precocity. The wool of the Toissonnaise Merino is of superior quality and the food value of the carcass has been increased over that of the primitive type.

The Friesian breed of sheep, E. MARRE (*Bul. Mens. Off. Renseig. Agr. [Paris], 8 (1909), No. 9, pp. 1240–1254, pl. 1; Prog. Agr. et Vit. (Ed. l'Est-Centre), 30 (1909), No. 42, pp. 477–486, fig. 1*).—An account of the dairy sheep of East Friesland, which the author thinks should be imported to the Roquefort and other dairy districts of France.

Measurements and weights of goats at the live stock show in Leipsic, 1909, AUGST (*Jahrb. Deut. Landw. Gesell., 24 (1909), No. 3, pp. 854–857*).—Weights, body measurements, and other data of 19 white hornless goats are given.

Goats' hair and mohair from Uganda (*Bul. Imp. Inst., 7 (1909), No. 3, pp. 263–266*).—Several samples of goat hair received from Uganda showed it to be a much better type than Afghan and others which are exported to England; it resembles somewhat an inferior kind of mohair and will probably be salable in England. From the same country there were also received 2 fleeces of purebred Angora goats, imported to that country from America, and 1 fleece from a second-cross Angora male. From an examination of these samples it was evident that mohair of a very promising quality can be produced in Uganda, but it is certain that unusual care will have to be taken in breeding the Angora goats in order to maintain a satisfactory flock.

The absorption of moisture from the atmosphere by wools, A. M. WRIGHT (*Jour. Soc. Chem. Indus., 28 (1909), No. 19, pp. 1020–1022*).—The purpose of this investigation was to determine under what conditions wool absorbs moisture from the atmosphere, and what constituents cause it to absorb relatively large amounts.

The results are summarized as follows: "The relative humidity of the atmosphere [influences the absorption of moisture], more moisture being absorbed during a period of high relative humidity than when the humidity is low. Pure wool fiber, of which greasy wool contains from 50 to 70 per cent and slipe wool about 75 per cent, can absorb from 18 to 20 per cent of its weight of moisture from the atmosphere, but this amount is not sufficient to account for all the moisture absorbed by the dry normal wool fiber. Natural wool fat, present in greasy wool to the extent of nearly 17 per cent and in slipe wool to 6½ per cent, is capable of absorbing about 17 per cent of its weight of atmospheric moisture. Suint, or wool perspiration present in greasy wools to the extent of nearly 13

per cent, and in slipe wools to about 2 per cent, is very hygroscopic, and can absorb from 60 to 67 per cent of its weight of moisture when exposed to the atmosphere. Fatty matter other than natural wool fat, present in slipe wools to an amount of from 2 to 6 times that found in greasy wools, and picked up by the wool from the greasy underside of the skins during the washing process, has a retarding effect on the amount of moisture absorbed."

Measurements of swine, Junghanns (*Jahrb. Deut. Landw. Gesell., 24 (1909), No. 3, pp. 825–853*).—Body measurements are reported of 59 Berkshires, and 222 Improved German white and mixed German breeds of swine.

Fowls and eggs in China, W. R. Dorsey (*Daily Cons. and Trade Rpts. [U. S.], 1909, No. 3637, pp. 1–3*).—An account of the poultry industry in China.

China has, perhaps, more fowls than any other country, yet there are few farms where chickens are reared in large numbers. The present price of eggs is from 5 to 7 cts. per dozen in United States money. Ducks are reared in immense numbers about the lowlands of Hankow and are herded like sheep. Factories in Hankow prepare a large amount of albumen and egg yolks for export to Europe.

Live stock and hides, J. J. Slechta, E. Betts, and E. D. Winslow (*Daily Cons. and Trade Rpts. [U. S.], 1909, No. 3688, pp. 1–3*).—These reports include data from Brazil, Colombia, and Sweden.

The number of cattle in Brazil is about 25,000,000, but the statistics for other kinds of live stock are not adequate for an estimation of the number. The total exports of hides from Brazil in 1908 were as follows, in metric tons: Salted hides, 23,314; dry hides, 7,095; goat skins, 2,579; sheep skins, 760; lamb skins, 94; miscellaneous, 130.

In Colombia there are about 4,000,000 cattle. The number of cattle slaughtered in 1907 was 341,528, and the weight of hides exported was 3,447,562 kg. The figures for the live stock in Sweden in 1906 are as follows: 178,931 oxen, 1,792,075 cows, 579,079 calves, 1,051,119 sheep, 65,285 goats, and 563,634 horses.

Live stock statistics for the years 1907 and 1908 (*Riqueza Pecuaria Existencia, Importanción y Consumo de Ganado, Anos 1907 y 1908. Habana: Govt., 1909, pp. 73, pl. 1*).—In 1908 on the Island of Cuba there were 2,892,457 cattle, 491,830 horses, 55,184 mules, and 3,102 asses, an increase in all cases over the figures of 1907. Since 1904 the number of importations has steadily descreased.

DAIRY FARMING—DAIRYING.

Alfalfa meal v. wheat bran for milk production, J. B. Lindsey (*Massachusetts Sta. Rpt. 1908, pt. 2, pp. 158–166*).—The object of this experiment was to compare the effect of alfalfa meal with wheat bran upon the general health and condition of the animal, upon the yield of milk, milk solids and milk fat, and to note the economy of alfalfa meal as compared with bran as a feed for dairy stock.

In the first half of the trial 3 of the 6 new milch cows received the alfalfa meal ration for 6 consecutive weeks, the other 3 receiving the wheat bran ration. In the second half of the trial the conditions were reversed. The basal ration consisted of hay, rowen, gluten feed, and corn meal, to which was added 4.8 lbs. of either alfalfa meal or wheat bran.

The herd gain in live weight was 119 lbs. with the alfalfa meal, and 165 lbs. with the wheat bran. During the bran ration the average daily yield of milk was 19.36 lbs. at a cost of 1.21 cts. per pound, and during the alfalfa meal ration 19.06 lbs. at a cost of 1.32 cts. per pound. The cost of butter with the 2 rations was 19.5 and 21.8 cts. per pound, respectively. The bran was estimated at $22 and the alfalfa meal at $30 per ton.

The variations in the quality of the milk were not sufficiently pronounced to warrant any particular deduction. It required substantially equal amounts of digestible matter to produce equal amounts of milk and milk products. Owing to the excess of fertilizer ingredients, especially nitrogen, in the wheat bran, that ration would furnish a somewhat richer manure. It is believed that if the grain rations had consisted of simply alfalfa and corn meal, or bran and corn meal, the results would have been more favorable to the bran. The author sees no advantage in replacing bran by alfalfa meal, for the reason that the quality of the latter is measured by the grade of the hay employed and is likely to vary considerably. Late-cut alfalfa has a low digestibility, and will prove decidedly inferior to a good quality of bran.

Animal residues as a food for farm stock, J. B. Lindsey (*Massachusetts Sta. Rpt. 1908, pt. 2, pp. 149–157*).—This is a discussion of the use of meat and fish meals as feed for stock. An experiment is also reported, the object of which was to compare the total protein of dried blood with an equal amount of protein in cotton-seed meal upon the yield of milk and milk ingredients.

Two lots of 2 cows each were fed by the usual reversal method for 2 periods of 2 weeks each separated by an interval of 7 days. The average basal ration consisted of 20 lbs. hay, 3 lbs. bran, 3 lbs. hominy, while the supplementary ration was 1 lb. hominy and 1.13 lbs. blood, against 2.25 lbs. cotton-seed meal. The extra pound of hominy was added to make up the deficiency of carbohydrate material in the blood.

The yields of milk, total solids, and fat were practically identical in each period and practically the same amounts of dry and digestible matter were required. The blood meal ration favored a noticeable increase in live weight. Estimating the hay to be worth $15, bran $22, hominy $24, cotton-seed meal $29, and blood $55 a ton, the milk cost 1.04 cts. and butter 17.7 cts. per pound with the blood meal ration and 1.02 and 16.9 cts., respectively, with the cotton-seed meal. It was not possible to detect any objectionable flavor which could be attributed to the blood. The blood ration in no way interfered with the normal condition of the animals, all of which consumed it readily.

The following conclusions are drawn:

"Dried blood contains some 85 per cent of protein, and when properly prepared (not overheated) has proved itself to be highly digestible and well suited as a concentrated protein nutrient for farm stock.

"For cows in milk it may be fed in amounts varying from 1 to 2 lbs. daily, mixed with concentrates of vegetable origin. A satisfactory combination for a day's ration consists of 2 to 3 lbs. of wheat bran, 2 to 3 lbs. of corn or hominy meal and 1.5 lbs. of dried blood. Other mixtures can be made containing blood as a constituent.

"It is believed to be the part of economy to first utilize blood as an animal food rather than to apply it directly as a fertilizer.

"The present price of prepared blood, its lack of distribution in local markets and the ignorance of the consumer concerning its merits as a food have thus far prevented its general use for feeding purposes."

Effect of soy bean meal and soy bean oil upon the composition of milk and butter fat, and upon the consistency or body of butter, J. B. Lindsey, E. B. Holland, and P. H. Smith (*Massachusetts Sta. Rpt. 1908, pt. 2, pp. 66–110*).—This is a continuation of a series of experiments designed to study the effect of different feeds upon the character and composition of dairy products.

Two lots of 6 cows each were fed 3 periods. One lot received throughout an average daily ration of bran, ground oats, corn meal, gluten feed, cotton-seed meal and mixed hay, the grain mixture amounting to 7.5 lbs. The second lot were fed the same ration in the first period, which lasted 14 days, but in the

second period of 28 days, 2.8 lbs. of the grain ration was replaced by 2.3 lbs. of soy bean meal minus the oil, and in the third period, lasting 21 days, 0.6 lb. of the normal grain ration was replaced by the same amount of soy bean oil. In the second period the second lot consumed about ½ lb. more digestible protein than lot 1, and in the third period 0.6 lb. more fat. One cow lost in live weight owing to digestive disturbances in the second period, but the flow of milk appeared normal except in the case of one cow in lot 2 near the close of the third period. Methods for determining the chemical composition of the milk fat are given.

In the first period lot 1 yielded a fat with a little higher saponification value than lot 2. Other minor differences were also noted. In the second period careful study of the analytical data failed to reveal any marked differences that could be attributed to the change in the ration. In the milk fat from lot 2 the higher iodin number might indicate a small increase in the amount of unsaturated acids beyond that resulting from the advance in the period of lactation. If such were the case the increase in all probability should be attributed to the influence of the oil rather than to the bean protein. In the third period when the bean meal was replaced by the normal ration and the soy bean oil, the Kottsdorfer number in lot 2 fell from 231.59 to 221.65, and the Reichert-Meissl from 27.05 to 23.27. The iodin value increased from 31.90 to 40.25, giving additional evidence of the increase of oleic and possibly of linoleic acids. In terms of oleic acid, by calculation, this increase amounts to 9.26 points. In the first 2 periods both herds showed quite similar acid numbers, varying from 0.32 to 0.38. In the third period, in case of lot 1, the acid number increased slightly to 0.48, and in lot 2 to 1.39. The ether number naturally varied with the saponification and acid numbers, being lowest in the milk fat produced by lot 2 in the third period. The percentage of glycerol in fat fell to 12.04 in the case of lot 2 in the third feeding period. The total fatty acids were quite uniform except during the last period for lot 2. The Valenta test had a slightly lower turbidity point in lot 1 than in lot 2. In the second period this difference was more noticeable, and it was very marked in the third period, amounting to nearly 12°. Other differences were noted in the third period in the refractive index, insoluble fatty acids, the saponification number of the insoluble acids, and the soluble fatty acids. Methods for determining these and other contents are given.

The butter produced by lot 2 was much softer than that from lot 1. Samples were scored by experts in Boston and New York, and some of them, particularly those in lot 2 in the third period, were off flavor. Churning data and analyses of feeds are given.

The following conclusions were drawn:

"Soy bean meal partially extracted (2.3 lbs. per day and head) seemed to be without influence in changing the proportions of the several milk constituents or in imparting any flavor to the milk.

'Soy bean oil (0.6 lb. per day and head) was likewise without influence on the composition and flavor of the milk.

"Soy bean meal did not modify the chemical character of the butter fat, neither did it have any effect upon the separation of the fat from the milk serum, the time of ripening of the cream nor on the thoroughness of the churning. Expert butter scorers could not detect any particular flavor in the butter as a result of feeding the meal. The meal imparted a noticeable softness to the body of the butter, but not sufficiently so as to injure its commercial value excepting during the warm months. The softness of the body of the butter was due probably to the oil contained in the bean meal and not to the bean protein.

"Soy bean oil depressed the volatile fatty acids (Reichert-Meisel number) and thus lowered the saponification number of the butter fat; it increased the

percentage of unsaturated acids (iodin number) and the total insoluble acids. The acid number and Valenta test were also increased. The oil did not noticeably change the melting point of the fat as measured by the Wiley test; it increased somewhat the refractive index.

"The oil caused a marked softness of the butter; the latter also contained some 2 per cent more moisture than did the butter produced by the normal ration. No other changes were observed."

On inheritance in the production of butter fat, H. L. Rietz (*Biometrika, 7 (1909), No. 1–2, pp. 106–126*).—This is a statistical investigation of inheritance in the production of butter fat made from data in Vols. 11–18 of the Advanced Register of the Holstein-Friesian Association of America. Vols. 1–10 were not used because they gave very few pairs of variates that satisfied the conditions. The paper is a pioneer study of this important side of cattle breeding and is of much interest theoretically because allowance has to be made for double selection, since only cows with a certain minimum of butter fat production are admitted to the record. Correlation tables are given and the results, which are discussed in detail, are summarized as follows:

"The correlation of age and production of butter fat by cows under 4.75 years is approximately two-thirds, and the regression is linear. The correlation of age and production of cows over 4.75 years is substantially zero. The coefficient of variability in production increases gradually from youth to 3 years old, and then decreases to maturity. Production of butter fat is a function transmitted to a marked extent. The coefficient of heredity between cows and dams in the performance of this function is probably at least as large as the coefficient of mean parental inheritance of physical characters in man. Inheritance in production is more pronounced in mature than in immature cows. A comparison of the results corrected for selection with the uncorrected values illustrated the great influence of selection in modifying the correlation coefficient."

The correlation coefficient for cows under 4.75 years old is 0.662±0.007; for cows over 4.75 years it is 0.030±0.016. If the 15 most extreme variates are excluded the correlation coefficient is 0.004±0.026. By including older cows the correlation coefficient is 0.688±0.006, a slight increase, while the regression of production on age is decreased. For the group under 4.75 years the regression of production on age is 1.901±0.021; for the group under 5.25 years, 1.819±0.018. The mean, standard deviation, coefficient of variation, and coefficient of correlation are given in the following table:

Mean, standard deviation, coefficient of variability, and coefficient of correlation of offspring, dams, and granddams.

Relationship of animals.		Mean.	Standard deviation.	Coefficient of variability.	Coefficient correlation.
Offspring and dams under 4 years	Offspring	10.687±0.057	2.136±0.040	19.99±0.38	0.344±0.023
	Dams	10.605±0.057	2.141±0.040	20.19±0.38	
Offspring and dams over 4 years	Offspring	15.316±0.070	2.543±0.049	16.60±0.33	0.284±0.025
	Dams	15.368±0.070	2.646±0.051	17.22±0.34	
Offspring and dams differing by less than 1 year	Offspring	12.913±0.063	3.292±0.045	25.46±0.36	0.651±0.011
	Dams	12.915±0.063	3.380±0.045	26.17±0.38	
Granddams and offspring	Dams	15.383±0.073	2.377±0.052	....	0.301±0.028
	Maternal granddams.	15.423±0.077	2.495±0.055	....	

The correlation of milk fat production with the production by dams of sires mated to the cows was 0.140±0.025. Multiple correlations showed that a few paternal granddams selected for fancy points affected the correlation coefficient

when the ancestors are weighted with their offspring. The method for making corrections for efficiency selection is described in detail. After making selections the standard deviation for cows under 2.25 years was 1.99, for cows 3 years old 2.89, for cows 4 years old 3.06, for mature cows 3.89, and for the entire group under 4.5 years 2.94. The corrected correlation coefficients are as follows: Between dam and offspring, for mature cows 0.63, for cows under 2 years 0.25, and for cows under 5 years 0.18; between granddam and offspring, for maternal granddams 0.38, and paternal granddams 0.25; and between dams and dams of sires with which they are mated, 0.39. It is thought that these values are somewhat higher than they should be, as breeders are liable to keep from the test animals that can barely meet the requirements. Use was made of the partial correlation coefficient to obtain an average value during growth.

"We have then 0.38 for a sort of average value of the correlation coefficient at fixed ages in the period of growth, 0.145 and 0.25 for uncorrected and corrected coefficients of cows under 2.25 years old, 0.28 and 0.63 for uncorrected and corrected coefficients after maturity. These results seem convincing of the fact that inheritance in production of butter is, in general, much more pronounced after maturity than at a fixed stage in the period of growth."

Relation of milk to the public health, W. A. Evans (*Milk Man, 2* (*1909*), *No. 9, pp. 4–7*).—Besides a general discussion of the danger of using unsanitary milk, this paper, which was read before the American Veterinary Medical Association, gives an account of the results of pure milk ordinances in Chicago which went into effect January 1, 1909 (E. S. R., 20, p. 783).

"Of Chicago's 30,060 8-gal. cans of milk 18,000 are pasteurized; 7,000 are from tuberculin tested cows, and 5,000 cans are not complying with the ordinance. The 7,000 cans of tuberculin tested milk come from 30,000 tuberculosis-free cows. Nearly all of our milk supply from Indiana comes from cows which have been tuberculin tested; about one-third of that from Wisconsin is from tested cows; but little of that in Illinois is from tested cows.

"The tuberculin testing has been a source of much fraud. Veterinarians have faked reports and farmers have immunized their cows preparatory to the test. In Indiana the work was done by the State and it averaged very satisfactorily. In Wisconsin and in Illinois it is promiscuously done and much incompetency and much fraud has been shown and some has been proven. The pasteurizing is done by 43 plants in town and 100 in the country. Some of the plants have done excellent work; some are faking, and some are incompetently run. Most of the faking is done by creameries and other butter plants. The holding pasteurizers are almost uniformly good, the flash pasteurizers are sometimes good and sometimes not. . . . Not infrequently a milk which was good at the pasteurizer was spoiled by a dirty bottle, a dirty cup, or dirty fingers in capping. The maximum number of bacteria found in a supposedly sterile bottle was 24,000. A count of 800 was not unusual.

"All in all, we are sure that it is easier to control pasteurizers than it is to control tuberculin testing, and certainly than to control 12,000 farms. With us these ordinances are not only getting us better milk, but they are helping us to get the farms cleaned up. . . . We are sure that in optional tuberculin testing and pasteurization, properly controlled, we have found the proper solution of this vexed milk question, a solution which in time will be found acceptable alike to farmer, dealer, consumer and health official."

A study of farm butter making in New Hampshire, F. Rasmussen (*New Hampshire Sta. Bul. 141, pp. 247–280, figs. 6*).—This bulletin reports an inquiry concerning the condition of the dairy industry and the methods of butter making as practiced on the farms throughout the State, and gives many suggestions on butter making with special reference to farm conditions.

The information concerning the dairy conditions was obtained by sending out circular letters and by a field agent who visited over 100 farms in different parts of the State. Dairying seemed to be increasing in some sections, decreasing in others. A large quantity of butter is made on farms because of poor transportation facilities, a widely scattered population, small herds of dairy cows, and a special demand for good dairy butter.

The amount of butter made on farms varied from 7 to 500 lbs. per week and averaged about 58.5 lbs. The majority of farmers churned only once or twice a week and sold to private trade in prints. The price of butter ranged from 20 to 40 cts. per pound.

The more common defects found in the farm butter were rancidity, poor flavors, and a mottled condition, and were due to poor equipment, lack of cleanliness, and indifference or ignorance of modern sanitary methods in handling milk and making butter. The overrun varied from 4.7 to 19 per cent. Much of the cream was old and sour and was often churned at too high a temperature. Overchurning and overworking are also common faults.

Details are given of the equipment required for making farm butter by modern sanitary methods on a farm carrying about 20 cows.

On the staining of cheese by iron and copper salts and the analytical proof of this metal in cheese curd, A. SCHAEFFER (*Milchw. Zentbl., 5 (1909), No. 10, pp. 425–430*).—Attention is called to the frequent discoloration of cheese due to contact with the different metals of which dairy utensils are made. It was found that 0.0005 per cent of ferric oxid in the curd may cause enough discoloration to affect the market value of the cheese, although a cheese may contain as much as 0.0002 per cent when ripened quickly with soda and show no discoloration for about 8 days. When stored for a longer period the cheese is discolored. Staining occurs less frequently with copper, and 0.001 per cent of cupric oxid is necessary to cause it. Methods of analysis are given on page 212 of this issue.

"Kokkelin" a Finnish cheese food (*N. Y. Produce Rev. and Amer. Cream., 29 (1909), No. 2, p. 63*).—A note on an article by Grotenfelt, concerning a dairy dish used in Finland whereby the skim milk is utilized and preserved for winter use.

"When the cream has been removed the milk, which at that time generally is more or less coagulated (shallow setting), is placed near the bake oven or other warm place so that the milk coagulates firmly and the whey separates. When firm, the whey is removed and the 'kokkelin' (curd) is placed in a wooden vessel and covered with bark pieces (birch bark). On top of this is poured cold water which, now and then, is removed and replaced so as to get rid of the last sour whey. The whey is used mixed with water or milk as a drink for man and beast and the curd thus treated may be kept under water for months and constitutes an important item in the winter food."

Cheese milk payments, G. A. OLSON (*N. Y. Produce Rev. and Amer. Cream., 29 (1909), No. 2, pp. 74, 76, 77*).—The disadvantages of various methods of calculating the yield of cheese are pointed out. The author submits a table for computing the yield based on the percentages of both fat and total solids.

[Hydrostatic cream balance] (*Hoard's Dairyman, 40 (1909), No. 40, p. 1185, fig. 1*).—A simple and sensitive hydrostatic cream balance for weighing cream in testing the percentage of fat is illustrated and described.

This apparatus, known as the Wisconsin hydrostatic cream balance, was devised at the Wisconsin Experiment Station. It consists of a brass float similar to a hydrometer, which is placed in a cylinder of water. The float supports a platform on which are placed a cream bottle and a 9 gm. weight. Small (0.1

gm.) weights are added until the float sinks to a line marked on the spindle. The 9 gm. weight is then removed and the cream pipetted into the bottle in sufficient amount to sink the float again to the mark.

VETERINARY MEDICINE.

Studies on blood and blood parasites, II. CRAWLEY (*U. S. Dept. Agr., Bur. Anim. Indus. Bul. 119, pp. 31, figs. 3*).—Thus bulletin consists of three papers.

I. *Observations on mammalian blood with dark-field illumination* (pp. 5–15).—The apparatus used in these studies consisted of a substage condenser, arc lamp, and rheostat, the latter serving to cut down the laboratory current to 4 amperes. Attention is called to the fact that in the use of this apparatus the top part of the condenser, the slide, and the cover glass must all be scrupulously clean and that the film of oil between the condenser and the slide must be free from air globules. The blood studied was that of the cow, sheep, rabbit, guinea pig, white rat, and man. The phenomena observed are treated under the captions blood dust, beaded threads, flagellated erythrocytes and free flagella, bodies showing pseudopodia, erythrocytes, leucocytes, and blood plates.

II. *The priority of Cryptobia Leidy, 1846, over Trypanoplasma Laveran, and Mesnil, 1901* (pp. 16–20).—It is shown that the rules of priority compel the use of the generic name Cryptobia. The synonymy of the genus Cryptobia and the several species belonging to it has been worked out and is presented together with a bibliography of the literature relating to the subject.

III. *Trypanosoma americanum n. sp., a trypanosome which appears in cultures made from the blood of American cattle* (pp. 21–31).—The author has studied the blood of cattle in this country and found that when cultured in common beef bouillon it develops trypanosomes in from 2 to 4 days, varying with the temperature. These trypanosomes also appear in cultures of cow's blood in mutton bouillon, either acid or alkaline. They appeared in the blood of all cows tested including animals parasitized with and animals free from *Piroplasma bigeminum.* Although many of the cultures were examined daily from the first, flagellates were never found on the first day and but once on the second.

"It may be concluded that the trypanosome here described and figured is a common parasite of healthy American cattle. Its morphological peculiarity is that the trophonucleus and kinetonucleus lie very close together. This peculiarity is shown by *T. transvaliense*, taken to be a variety of *T. theileri*, and, as well as can be made out from his figures, by the trypanosome found by Miyajima. If this last fact be so, then Miyajima is in error in his conclusion that his flagellate is a phase of Piroplasma. At all events, the fact that trypanosomes appear in cultures of blood from healthy cattle is of considerable significance, and is decidedly against the belief that they are stages in the life history of a hæmosporidian."

The leucocytozoa: Protozoal parasites of the colorless corpuscles of the blood of vertebrates, ANNIE PORTER (*Sci. Prog. Twentieth Cent., 4 (1909), No. 14, pp. 248–266, figs. 4*).—Following a general description of the leucocytozoa an account is given of their movements, comparative morphology, multiplication, and reproduction, mode of transmission, distribution, and nomenclature.

A bibliography of 19 titles is included.

The modes of division of Spirochæta recurrentis and S. duttoni as observed in the living organisms, H. B. FANTHAM and ANNIE PORTER (*Proc. Roy. Soc. [London], Ser. B, 81 (1909), No. B 551, pp. 500–505*).—From observations on the living organisms the authors find that both longitudinal and transverse division occur in spirochetes as seen in *S. recurrentis, S. duttoni, S. anodontæ*, and *S. balbianii.*

Further observations upon tsetse flies and trypanosomes, KLEINE (*Deut. Med. Wchnschr., 35 (1909), No. 45, pp. 1956–1958, figs. 4; Sleeping Sickness Bur. [London], Bul. 11, Sup., pp. 449–454*).—This is a continuation of investigations previously noted (E. S. R., 21, p. 785).

From experiments conducted in which large numbers of flies bred from pupariums were fed upon infected monkeys and later upon healthy monkeys, it is concluded that *Glossina morsitans* does not transmit *Trypanosoma gambiense*. No less than 805 *G. palpalis* and 722 *G. morsitans* bred from pupariums were fed first on infected and then on healthy animals, but no observation was made which supported the hypothesis of hereditary transmission of pathogenic trypanosomes.

The author concludes that in the epidemology of sleeping sickness and of animal trypanosomiasis no part is played by inherited trypanosomes and that mechanical transmission has a subordinate importance or none at all. In the course of his investigations he has met with no case in which trypanosomes were conveyed mechanically from animal to animal, 1,910 flies (*G. palpalis* and *morsitans*) having been fed on infected animals and 18 to 24 hours afterwards on susceptible healthy animals without a case of infection. He states that it seems fairly certain that trypanosomes of mammals in the gut of flies can be distinguished from the flagellates of unknown origin. *T. tullochii* is believed to be a developmental form of *T. gambiense*, as it was often seen in *G. palpalis* artificially infected with that trypanosome. He doubts if *T. gambiense* can be distinguished in the fly from *T. brucei* and perhaps other mammalian trypanosomes.

Feeding experiments conducted seem to show that only those flies which feed on warm-blooded animals drop larvæ. The experiment also shows that the female fly requires mammalian blood to produce young and that crocodile blood can not replace it.

The development of Trypanosoma gambiense in Glossina palpalis, D. BRUCE ET AL. (*Proc. Roy. Soc. [London], Ser. B, 81 (1909), No. B 550, pp. 405–414, pls. 2; abs. in Sleeping Sickness Bur. [London] Bul. 10, pp. 369–371*).—In the authors' experiments flies first became infected 18 days after their first feed on infected animals and continued infective up to 75 days. There is some evidence that but one of the 60 artificially infected flies used became infective. It is considered that in nature the proportion must be even less, as many of the flies, in many localities at least, can never have fed on an animal the blood of which contained *Trypanosoma gambiense*.

On the seasonal prevalence of Trypanosoma lewisi in Mus rattus and in M. decumanus and its relation to the mechanism of transmission of the infection, G. F. PETRIE and C. R. AVARI (*Parasitology, 2 (1909), No. 3, pp. 305–324, charts 8*).—The authors find that there are definite seasonal variations in the prevalence of trypanosome infections in *Mus rattus* and *M. decumanus*. It is probable that temperature operates by influencing a developmental cycle of the trypanosomes in the transmitting insects.

A case of Trypanosoma theileri in Madras, I. F. VALLADARES (*Jour. Trop. Vet. Sci., 4 (1909), No. 4, pp. 544, 545, pl. 1*).—A report of the symptoms in a bull at Madras which is thought to have died of trypanosomiasis. *T. theileri* was found in blood smears but no piroplasmata were discovered.

Trypanosoma theileri and galziekte, H. T. PEASE (*Jour. Trop. Vet. Sci., 4 (1909), No. 4, pp. 532–539*).—From recent investigations and inquiries it appears that *T. theileri* is fairly common among the cattle and buffalo of India, and that it is doubtful whether this parasite gives rise to any disease in them.

A note on the occurrence of a trypanosome in the African elephant, D. BRUCE ET AL. (*Proc. Roy. Soc. [London], Ser. B, 81 (1909), No. B 550, pp. 414–*

416, pl. 1).—The authors describe a trypanosome found in the blood of an elephant shot near Ngogole on the east shore of Lake Albert. The parasite has been given the provisional name *Trypanosoma elephantis*.

The presence of anthrax in the intestinal contents of animals, A. CIUCA and G. FENEA (*Compt. Rend. Soc. Biol.* [*Paris*], *67* (*1909*), *No. 27*, *pp. 301, 302*).—The authors examined the feces of guinea pigs, rabbits, sheep, and pigs affected with anthrax and almost invariably found that the bacilli were present and in numbers inversely proportional to the rapidity of the disease. The intestine favors spore formation, in which stage the bacillus is resistant to the putrefaction, as anthrax cultures can always be obtained by heating the fecal matter to 65° C. Under these conditions the colonies are the more numerous the later the examination is made. A bacteriological examination of the feces therefore affords a certain means for deciding whether an animal has died of anthrax, even though the cadaver has become more or less putrid.

Vaccination against symptomatic anthrax in Switzerland and some other countries, R. BALAVOINE (*Schweiz. Arch. Tierheilk.*, *51* (*1909*), *No. 3*, *pp. 137–185*, *figs. 7*; *abs. in Bul. Inst. Pasteur*, *7* (*1909*), *No. 14*, *pp. 636, 637*).—A review of the work on protective inoculation against this disease.

The specific changes in the ganglion cells of animals affected with rabies and distemper, O. LENTZ (*Ztschr. Hyg. u. Infektionskrank.*, *62* (*1908*), *No. 1*, *pp. 63–94*, *pl. 1*).—A contribution to our knowledge of the origin and importance of Negri's bodies.

The rapid diagnosis of rabies, F. NERI (*Centbl. Bakt.* [*etc.*], *1. Abt.*, *Orig.*, *50* (*1909*), *No. 3*, *pp. 409–412*).—A new method for staining Negri's bodies is described.

Rabies in the street dogs of Constantinople, P. REMLINGER (*Bul. Soc. Cent. Méd. Vét.*, *86* (*1909*), *No. 8*, *pp. 137–144*; *Jour. Trop. Vet. Sci.*, *4* (*1909*), *No. 4*, *561–566*).—The street dogs of Constantinople, estimated at from 60,000 to 80,000, are allowed absolute liberty, the vicious ones being destroyed from time to time.

In spite of this almost complete absence of sanitary policing, rabies among these dogs is extremely rare. It has been suggested that they are more or less immune to the disease. This, however, is not the case, as during the course of 8 years' residence in Constantinople the author has inoculated hundreds of street dogs under the most varied conditions and with different strains of virus, but has never observed any particular resistance of the indigenous dog.

It is also shown that the rarity of rabies in street dogs is not due to the prevalence of the paralytic form of the disease, as furious rabies is about twice as common as the paralytic form. It is believed that it is "the special conditions under which street dogs live, their distribution into distinct groups, and the subtle instinct which makes others avoid a rabid dog to which we must attribute more than to any peculiarities in the disease itself the rarity of rabies in Constantinople street dogs."

Contribution to the study of hemorrhagic septicemia, S. H. GAIGER (*Jour. Trop. Vet. Sci.*, *4* (*1909*), *No. 4*, *pp. 501–524*, *pl. 1*, *fig. 1*, *charts 8*).—The cultural characters, morphology, biology, pathogenicity, and distribution of the bacilli in the animal body are here reported upon.

The bacilli are said to be present in every organ and fluid of the animal body. The accepted theory is that they live in the damp soil or in the soil water, that the disease appears during the rains when the soil water rises, and that animals become infected by ingestion. Immunity can be conferred on animals by feeding on virulent bouillon cultures; by starting with less than a fatal dose of pure bouillon culture, and giving increased doses; by commencing with an

inoculation of bacilli separated from their toxins and later giving toxin subcutaneously in increased doses; and by inoculating attenuated bacilli.

On the relation of Rocky Mountain spotted fever to the typhus fever of Mexico, J. F. Anderson and J. Goldberger (*Pub. Health and Mar. Hosp. Serv. U. S., Pub. Health Rpts., 24 (1909), No. 50, pp. 1861, 1862*).—Observations of typhus fever in Mexico City bring out certain definite clinical differences between this disease and Rocky Mountain spotted fever.

A further note upon the relationship between avian and human tuberculosis, S. G. Shattock and L. S. Dudgeon (*Lancet [London], 1909, II, No. 24, pp. 1739–1742*).—"These various results show that the white rat is immune to the avian tubercle bacillus, whether the bacillus is experimentally injected (in pure culture or directly from the diseased viscera) or whether it is introduced in large quantities by the mouth."

The antibodies in tuberculosis and their relation to tuberculin inoculation and vaccination, W. J. Butler and W. T. Mefford (*Jour. Amer. Med. Assoc., 53 (1909), No. 25, pp. 2092–2094*).—The authors have drawn the following conclusions:

"No relation exists between the complement-binding authority and tuberculin inoculations and vaccinations, between the complement-binding antibody and the opsonic index, or between the opsonic index and the tuberculin skin reaction.

"Not only have our examinations failed to show any relation between tuberculin antibodies and tuberculin reactions and inoculations, but, on account of observing occasionally an inhibition of hemolysis with normal serums, we are strongly inclined to believe that the complement-binding reaction is not specific for tuberculosis."

The loco-weed disease, C. D. Marsh (*U. S. Dept. Agr., Farmers' Bul. 380, pp. 16, figs. 4*).—This is a brief practical presentation of the results of the work on the loco disease, intended to meet the immediate needs of ranchmen and stockmen on the western ranges and the National Forests. Detailed accounts of field and laboratory investigations have been previously noted (E. S. R., 20, p. 280; 21, p. 484).

An unrecorded poison plant, A. J. Ewart (*Jour. Dept. Agr. Victoria, 7 (1909), No. 6, p. 391*).—Pimpernel or shepherd's weather glass (*Anagallis arvensis*), formerly prized as a medicine, is reported to have killed a number of sheep. The active principle is unknown, but it appears to be a narcotic. It is also reported to have killed dogs, to which it was administered as a medicine, by producing inflammation of the stomach. A blue flowered form (*A. cœrulea*), which is very common, has similar properties.

Fatal colics in consequence of mold (Penicillium glaucum) poisoning, Hack (*Ztschr. Veterinärk., 21 (1909), No. 7, pp. 328–330, fig. 1; abs. in Vet. Jour., 65 (1909), No. 413, pp. 590, 591*).—A report on the poisoning of horses in Hamburg by the feeding of moldy grain.

Poisoning by raw potatoes (*Veröffentl. Jahres.-Vet. Ber. Tierärzte Preuss., 7 (1906 [pub. 1909]), pt. 2, p. 34; Vet. Rec., 22 (1909), No. 1114, p. 326*).—Two outbreaks of cattle poisoning due to eating large quantities of raw potatoes are reported. In the first, which was among a herd of cattle numbering 64 head, the symptoms resembled those of foot-and-mouth disease. In the second, 2 cows which had been fed potato parings developed eczema of the hind limbs, as in the first outbreak, and in addition diarrhea. Emaciation set in and in one case was so severe as to necessitate slaughter.

Cattle poisoning from arsenate of lead, J. B. Paige (*Massachusetts Sta. Rpt. 1908, pt. 2, pp. 183–199*).—In order to determine whether farm animals are poisoned by the ingestion of grass and foliage of shrubs sprayed with arsenate of lead as used in the destruction of the gipsy moth, feeding experiments

were conducted with 5 mature cows which had been condemned as tuberculous. The details of the experiments including the symptoms of the animals are reported in tabular form, followed by reports of the post-mortem examinations. Disparene was the form of arsenate of lead used. "In the case of cow No. 1, 29 gm., administered at the rate of 1 gm. per day, produced violent symptoms of poisoning. With animal No. 2, 16.5 gm., given in daily doses of ½ gm. per day, caused violent purging, loss of appetite and paresis. No. 3 took 151 gm. in 2, 3 and 4 gm. doses daily before equally marked symptoms of poisoning appeared. With No. 4, 28.35 gm. given at one dose in capsule at 9.45 a. m. produced toxic effects in less than 24 hours, from which the animal did not recover completely for 6 or 7 days. In the case of No. 5, 56.70 gm. caused death in 69½ hours. A study of the records of the 5 animals shows that frequently repeated small doses of the arsenate have the same effect in the end as do large nonfatal doses given at one time. In feeding the lead arsenate paste it was found necessary to adopt every conceivable means to induce the cows to take it after a few doses had been given. At first when mixed with the hay or grain it was readily eaten, but after a short time the animals would carefully separate every particle of the paste from the hay or grain and leave it uneaten. . . . When the hay that had been drenched with 1 and 2 oz. of lead arsenate in water was allowed to become thoroughly dried, it was readily eaten by the cows that had previously refused the fresh paste, even when thoroughly mixed with hay and grain, or inclosed without capsule inside of pieces of roots and apples."

Milk was analyzed, and also fed to a calf, but failed to give evidence of the presence of lead or arsenic. Parts from the different organs of the second animal were analyzed as a composite specimen and found to contain abundant evidence of lead and traces of arsenic. A brief summary is given of the symptoms of acute and chronic poisoning, diagnosis, prognosis, and treatment.

A moderately heavy growth of herdsgrass grown on an area 35 ft. in diameter was found, when thoroughly hayed, to weigh 50 lbs. From this it is computed that with a drip of 1 gal. in 10 of a mixture of 10 lbs. of the arsenate to 100 gal. of water, each 10 lbs. of the hay would carry 9.06 gm. of the arsenate paste, or practically one-half of that amount of the dried arsenate. The author does not consider it probable that a single feed of such hay would produce serious effects but that the continuous feeding of it for several days in succession would do so. Judging from the experience in the feeding of treated hay, it is thought that the animals would eat sufficient to cause fatal poisoning.

In these experiments the author was unable to detect an individual susceptibility to the action of the poison. It is thought that the harmless effects of arsenate of lead on a horse noted by Kirkland (E. S. R., 10, p. 567) is accounted for in part at least by the natural nonsusceptibility of the animal to the action of lead, to which ruminants appear to be particularly susceptible.

Diseases of the stomach and bowels of cattle, A. J. MURRAY (*U. S. Dept. Agr., Bur. Anim. Indus. Circ. 68, rev., pp. 14*).—A reprint with slight changes from the Special Report on Diseases of Cattle previously noted (E. S. R., 21, p. 283).

The Grand Traverse disease or Lake Shore disease, C. D. SMITH (*Michigan Sta. Spec. Bul. 50, pp. 3–10*).—Complaints having been made to the station in 1904 of the prevalence of this disease about West Olive in Ottawa County and elsewhere, animals were purchased for examination and treatment. Investigations have also been conducted under the Adams fund and are here reported in detail. A report of a visit to the section where the disease occurs by Dr. W. Giltner is appended to the account.

"The symptoms of this disease are well defined. They consist of general emaciation so extreme as to indicate that all of the superficial fat of the body had been used, leaving the skin apparently attached to the bones. At the outset the head is carried low with drooping ears. The coat stares and the appetite falls off. The animals drink less and less as the disease advances, until finally they refuse to drink altogether. As the appetite fails it becomes depraved. The cattle eat such materials as wood, leather, rope or bark from stumps. The chewing of bones is quite common, as it is in many other ailments of the digestive tract. From the beginning the bowels show a tendency toward constipation, which increases. As the disease advances the gambrel joints or hocks approach each other, while walking. The animal places one foot in front of the other, describing a half circle with each hind foot, at each step. . . .

"The third stomach, or manifolds, seemed to be the seat of the disease and here extensive lesions were often found. Where the disease had so far progressed that the animal was scarcely able to stand, the contents of the manifolds were dry, hard and seemingly attached, as if glued, to the lining membrane. When the autopsy took place after doses of oil and gruel had been given, there were found openings in the contents of the stomach through which food could pass, but where the examination was made prior to the beginning of the laxative treatment, the contents of the stomach seemed to be one solid mass, filling the various divisions between the folds of the stomach. Even after the laxative treatment was well under way, when post-mortems were held, masses of dried, hardened feed were still found occupying the spaces between the folds. When the disease had progressed so far that the animals were too weak to stand, the lining membrane of this third stomach seemed to slough off in a slimy condition; in other cases the divisions of the manifold itself were readily torn by slight pressure of the fingers. The gall bladder was almost invariably enlarged, sometimes to twice its natural size."

No specific agent has been incriminated as the cause of the disease. It appeared to be due to several conditions that prevail, namely, dry June grass pasture followed by dry fodder in winter, ingestion of more or less sand, insufficient water, the presence of great numbers of horn flies, ergoted rye, and cold winter quarters with insufficient attention.

All animals able to stand on arrival at the station and fed laxative feed recovered and made astonishing gains after the return of the appetite and the ability and willingness to drink. Observations about West Olive confirmed the idea that the removal of cows from their own districts to higher lands, where more abundant rations could be fed them, usually resulted in recovery. Cows which had been pastured continuously on clover pasture, or on any succulent pasture, did not have the symptoms of this disease in the late fall. The rule seemed invariable that the cows then sick with the disease were only such as had been running on dry pasture where the grass was thin, ripe, and dried up. It sometimes transpired that cows which had been pastured on succulent pasture when placed on very dry feed succumbed to the disease late in the winter or in the spring following.

Contagious abortion of cattle, A. NUESCH (*Schweiz. Arch. Tierheilk., 50 (1908), No. 5, pp. 323–326; abs. in Vet. Rec., 22 (1909), No. 1097, p. 48*).—The author has checked this disease by the internal administration of carbolic acid, and recommends $1\frac{3}{4}$ to $2\frac{5}{8}$ pts. of a 1 per cent solution of carbolic acid in water daily in a single dose. Both pregnant cows and those which have already aborted are thus treated, and the daily medication is continued from 5 to 10 days. No unfavorable effects of the drug were observed.

On biliary fever in cattle in German Southwest Africa, E. Leipziger (*Deut. Tierärztl. Wchnschr., 17 (1909), No. 11, pp. 150–152; abs. in Jour. Trop. Vet. Sci., 4 (1909), No. 4, p. 596*).—In this account of the disease and its occurrence in German Southwest Africa, the author calls attention to the fact that he has never found any trypanosome in the blood of the affected animals which came under his observation, although Theiler (E. S. R., 20, p. 680) considers the disease to be so caused.

Specific chronic enteritis of cattle (Johne's disease) (*Vet. Jour., 65 (1909), No. 414, pp. 608–614*).—A summary of papers presented at the International Veterinary Congress at The Hague, 1909, by B. Bang, E. Liénaux, W. Stuurman, Miessner, H. Markus, and J. Bongert.

Avian tuberculin as a diagnostic agent in Johne's disease, O. Bang (*Centbl. Bakt.* [*etc.*], *1. Abt., Orig., 51 (1909), No. 4, pp. 450–455; abs. in Vet. Rec., 22 (1909), No. 1115, pp. 343, 344*).—Although cattle suffering from Johne's disease do not react to injections of ordinary tuberculin, unless they are also simultaneously affected with tuberculosis, experiments conducted by the author show that they do react to avian tuberculin. The doses of avian tuberculin employed ranged from 0.75 gm. to 2 gm. (approximately 13 to 35 minims). He contests the assumption that Johne's disease may be caused by the bacillus of avian tuberculosis, objecting to it because fowls are resistant to attempts to infect them by feeding and inoculation with material from Johne's disease, and because cattle, after feeding with avian tubercle bacilli, develop true tuberculosis.

Hook-worm disease in calves, J. O. Duschanek (*Tierärztl. Zentbl., 32 (1909), No. 8, pp. 114–118; abs. in Vet. Rec., 22 (1909), No. 1115, p. 344*).—The author records an outbreak of hook-worm disease on a farm at Prague, in which 28 out of 40 calves ranging from 5 months to a year old were lost. He recommends kamala and aloes, 5 gm. of each to be administered in water and continued until the evacuations become diarrheic. Calves which are treated in this manner sufficiently early recover completely. In addition the stalls should be thoroughly disinfected, the dung burned, and the animals kept within doors.

An epizootic among Algerian sheep, L. Caze (*Rev. Gén. Méd. Vét., 13 (1909), No. 155, pp. 633–639*).—Further investigations have led the author to conclude that the disease of sheep in Algeria, which has resulted in considerable loss, is due to some cause other than parasitic worms as previously noted (E. S. R., 21, p. 789). Micro-organisms have been found in great numbers in the blood, liver, spleen, lungs, and suprarenal capsules. It is thought that the disease is a pasteurellosis.

Protective inoculation against sheep pox, L. Voigt (*Arch. Wiss. u. Prakt. Tierheilk., 35 (1909), No. 3, pp. 295–301; abs. in Vet. Rec., 22 (1909), No. 1116, p. 360*).—The author confirms the results obtained by Konew as previously noted (E. S. R., 19, p. 1185).

The method consists of the subcutaneous injection of the goat with sheep pox material and the continued passing of the material thus obtained from goat to goat. The immunity conferred in this way is said to last for a year.

Cœnurus serialis in a goat, D. Dey (*Jour. Trop. Vet. Sci., 4 (1909), No. 4, pp. 556–560, pl. 1*).—A record of the occurrence of this parasite in the goat.

Hog cholera, M. Dorset (*U. S. Dept. Agr., Farmers' Bul. 379, pp. 23, figs. 3*).—This supersedes Farmers' Bulletin 24 (E. S. R., 6, p. 664) and has been prepared especially for the use of the practical farmer. The author urges those interested in preventive inoculation to cooperate with the state authorities who have control of the preparation of the serum.

The use of serum from immune hogs for combating hog cholera, M. Dorset (*Vet. Jour., 65 (1909), No. 413, pp. 559–564*).—A report presented at the Ninth International Veterinary Congress at The Hague, in September, 1909.

Attention is directed to 3 factors upon which the success of the work depends, namely, careful standardized serum, an efficient organization, and the commencement of the work in the spring or early summer.

The control of hog cholera, J. W. Connaway (*Ann. Rpt. Mo. Bd. Agr., 41 (1908), pp. 289–325, figs. 10; Missouri Bd. Agr. Mo. Bul., 7 (1909), No. 4, pp. 39, figs. 10*).—An address before the Missouri Swine Growers' and Breeders' Association on January 6, 1909, in which preventive and curative measures are discussed.

An epidemic of horses due to a Trichophyton, M. Pécus and R. Sabouraud (*Rev. Gén. Méd. Vét., 13 (1909), No. 154, pp. 561–586, figs. 14*).—Pécus here reports upon an outbreak among cavalry horses, in which 800 animals were affected, and due to a new variety of Trichophyton (*T. gypseum granulosum*). Cultural and inoculation studies of this parasite are reported by Sabouraud (pp. 571–586).

Canine distemper, its prevention and treatment by inoculation, Richter (*Die Hundestaupe, ihre Vorbeugung und Behandlung durch Impfung. Dessau, 1908, pp. 211, pls. 8; abs. in Rev. Gén. Méd. Vét., 13 (1909), No. 152, pp. 459, 460*).—During the course of the author's investigations in which antidistemper serums were used, including those of Piorkowsky and Gans, and the vaccines of Copeman, Phisalix, and of Jenner (cowpox), 140 dogs, ranging in ages from a few days to several months, were experimented upon. From the results obtained it appears that none of these possess any preventive or curative action against distemper.

A bibliography of 163 titles is appended to the work.

Kala-azar in Madras, especially with regard to its connection with the dog and the bug (Conorrhinus), C. Donovan (*Lancet [London], 1909, II, No. 21, pp. 1495, 1496*).—In 1,150 dogs obtained from Madras and Georgetown, the only parasites found were the so-called leucocytozoon of the dog, 94 being infected by this organism. There was no certain evidence of Piroplasma (Babesia) or Trypanosoma infection. In no case was *Leishmania donovani* found in the spleen, and attempts to inoculate dogs with it gave negative results. See also a previous note (E. S. R., 21, p. 183).

It has been determined that the reduviid bug (*Conorrhinus rubrofasciatus*), recently suspected of having some relation to the causation of kala-azar, feeds voluntarily on human blood, but attempts to procure the pullulation of *L. donovani* in its guts have failed.

The author has confirmed the discovery by Lafont (see p. 251), having found the flagellates in the latex of *Euphorbia pilulifera* growing in Madras. He believes this flagellate to represent a new genus for which he suggests the name Phytomonas.

A new anaerobic spore-bearing bacterium commonly present in the livers of healthy dogs, and believed to be responsible for many changes attributed to aseptic autolysis of liver tissue, S. B. Wolbach and T. Saiki (*Jour. Med. Research, 21 (1909), No. 2, pp. 267–278, pl. 1*).—Out of a series of 23 healthy dogs of all ages, both sexes, and representing many different types (mongrel) killed during a period of 7 months, 21 yielded the same bacillus—hitherto undescribed. In only one case did the liver contain any other kind of micro-organism.

The presence of this bacillus is in no way connected with the necroses commonly found in the livers of dogs (in this series in 15 out of the 23 dogs). It is a large spore-bearing, nonmotile, nonencapsuled, nonpathogenic, faculative

aerobe. The reaction to Gram's stain is intermediate. To the presence of this bacillus in livers of normal dogs may be attributed many results of so-called aseptic autolysis of liver tissue.

Linguatula tænioides, S. H. Gaiger (*Jour. Trop. Vet. Sci., 4 (1909), No. 4, pp. 528–531, pl. 1*).—The author reports an extraordinary prevalence of this parasite among pariah dogs in India. *Anchylostomum trigonocephalum* is said to have been found also in almost every dog examined, and to be the principal cause of excessive hemorrhage from the nostrils of European dogs in India.

Lehman's poultry doctor, H. H. Lehman (*[Ashland, Ohio, 1909], pp. 96, pls. 25, figs. 6*).—A treatise on poultry diseases, intended for the farmer and poultry raiser.

Experimental investigation of the spirillosis of fowls in Tunis, C. Comte and H. Bouquet (*Arch. Inst. Pasteur Tunis, 4 (1908), Oct., pp. 163–168; abs. in Bul. Inst. Pasteur, 7 (1909), No. 5, pp. 207, 208*).—The Tunis virus transmitted by *Argas persicus* is said to infect geese and ducks as well as hens.

On the pathogenic action of helminths in birds, Sarah Wehrmann (*Arch. Par., 13 (1909), No. 2, pp. 204–238, figs. 6; abs. in Bul. Inst. Pasteur, 7 (1909), No. 8, pp. 357, 358*).—The author reports studies made of the lesions produced by intestinal parasites, particularly *Echinorhynchus polymorphus, E. filicollis,* and *Hystrichis elegans.* It appears that certain helminths of birds play a rôle in the transmission of infectious diseases.

A tabular list of the intestinal parasites which were found in birds is appended.

Ascaris canis and A. felis, H. Glaue (*Zool. Anz., 33 (1909), No. 24–25, pp. 785–790, figs. 3; abs. in Jour. Roy. Micros. Soc. [London], 1909, No. 4, p. 463*).—The author finds that these 2 species are readily distinguished, the dog ascarid being twice the size of the cat parasite.

RURAL ENGINEERING.

Irrigation in North Dakota, T. R. Atkinson (*U. S. Dept. Agr., Office Expt. Stas. Bul. 219, pp. 39, map 1*).—This is one of the series of reports published by this Office giving the present status of irrigation in the several arid States and Territories, the aim being to supply such information as is needed by one contemplating settlement in the arid region. It gives data as to rainfall, water resources, irrigated and unirrigable areas, character of the lands and the products of irrigated land, and describes the existing and proposed irrigation projects. A discussion of the laws of the State controlling irrigation is also included.

The condition of the agricultural lands of the State in reference to water supply is summed up, as follows: Lands needing drainage, 3,255,000 acres; now drained, 432,000 acres; irrigable, 1,540,000 acres; and now irrigated, 64,000 acres.

Synopsis of Wisconsin drainage laws with forms and general suggestions, E. R. Jones (*Wisconsin Sta. Circ. Inform. 6, pp. 19; Sup. pp. 2*).—This synopsis of the Wisconsin drainage laws is supplemented by general suggestions, specimen forms for petitions, reports, and specifications, and a list of dredge owners, tile makers, and drainage engineers.

The hollow concrete fence post, C. A. Ocock (*Wisconsin Sta. Circ. Inform. 5, pp. 4, fig. 1*).—Data as to the construction of hollow and solid concrete fence posts for farm use are presented, including directions for building the forms, preparing the concrete mixture, and reinforcing and curing the posts.

Concrete silos, C. W. GAYLORD and P. H. WILSON (*Washington, D. C. [1909], pp. 68, figs. 37*).—This contains descriptions of single and double wall concrete and cement block silos. Directions for building are also given.

Boiler explosions in Germany during 1908 (*Chem. Ztg., 33 (1909), Nos. 124, pp. 1107, 1108, figs. 7; 125, p. 1116, figs. 3*).—A compilation of boiler explosions which occurred in Germany during 1908 with a description of the type of boiler, time in use, the method of manipulation and keeping in repair, and the possible cause of the explosion.

Heating the farmhouse (*Country Gent., 74 (1909), Nos. 2961, p. 1017; 2962, p. 1041; Sci. Amer. Sup., 68 (1909), No. 1769, p. 339*).—In this paper the desirability of equipping farmhouses with modern plumbing and lighting systems and heating appliances is pointed out. In the opinion of the author furnace heating possesses a number of advantages over other systems, such as the low initial cost of the apparatus and the supply of pure, fresh air which is available provided a proper fresh air inlet and cold air box are installed.

RURAL ECONOMICS.

Some needs of agriculture, H. H. DEAN (*Penn. Dept. Agr. Bul. 177, pp. 150–153*).—The needs emphasized in this article for the improvement of agriculture and rural conditions are organization and cooperation among farmers, regarded as of the greatest importance, freedom from tariff burdens, more direct representation of farmers in all legislation pertaining to the farm, more direct interest in and control of agricultural institutions by farmers, and more agricultural education of a scientific and practical nature.

Economic organization of rural life, J. L. COULTER (*Proc. Conf. Ed. South, 12 (1909), pp. 112–129*).—This is an address before the twelfth conference for education in the South held at Atlanta, Ga., April 14–16, 1909.

The paper emphasizes the necessity for the reorganization of agriculture and rural life in which cooperation is to dominate as a means of enabling the farmer to secure a reasonable profit and a larger net income as a result of his industry. Other steps to be taken for the "uplift of agriculture and the agricultural class are better educational facilities, better roads, more extended rural mail delivery, the parcels post, and better sanitary conditions."

While the author is convinced that a modification of our present educational system by placing it on a more extended agricultural basis is urgently needed in order to help solve some of the present economic problems of the farmer, he is still firm in the belief that "agriculture and life in the open country can never be elevated to the place it deserves until it is placed upon a profitable business basis," and that cooperation would be instrumental in bringing about this result.

Land reform, P. GUTZEIT (*Die Bodenreform. Inaug. Diss., Univ. Leipsic, 1907, pp. 141*).—This gives a critical history of modern schemes of land holding that have been advocated by reformers in England, America, Australia, France, Switzerland, and Germany, with particular reference to the relation of proposed reforms in land-holding to socialism and the physiocratic economic school. The criticisms offered by the author in conclusion relate to land nationalization as a means of solving social problems in their entirety and improving agrarian economic conditions, and to the land reform of small holdings.

The right of land inheritance according to the new law in Switzerland, H. L. RUDLOFF (*Fühling's Landw. Ztg., 58 (1909), No. 5, pp. 188–194*).—This article points out some of the features of the laws in different cantons in Switzerland bearing upon the rights of the heirs to real property (E. S. R., 21,

p. 492), and discusses some of the features of the new law with particular reference to farm properties and rural conditions.

The chief difficulty has been to prevent the further subdivision of farms under the largely general custom of the inheritance of equal shares in real property among sons and daughters. Under the new law provisions are made for the keeping intact of a farm property and the operation of a farm by the oldest son or other heir most competent to conduct the holding to the best advantage. The law provides for the protection of the other heirs in their rights, whether the property is sold or operated as a family holding.

According to the author, "the chief significance of the law lies in the fact that it has prevented the division of farm properties without overburdening in indebtedness the party who undertakes to operate the holding and without depriving him of his natural share in his inheritance."

Report and tables relating to Irish agricultural laborers, W. G. S. ADAMS (*Dept. Agr. and Tech. Instr. Ireland, Agr. Statis. 1908–9, pp. 48*).—Complete returns relating to the Irish migratory laborers in 1908 and of the wages of agricultural laborers in Ireland in 1908–9 are reported, discussed, and summarized as follows:

"In 1908 approximately 22,500 agricultural laborers migrated for an average of 5 to 7 months to England and Scotland, where they found employment as farm laborers. The wages earned by these laborers (excepting women workers), when engaged by the week, month, or season, commonly ranged from 16s. to 22s. per week and the average wage may be placed at not less than 18s. a week. When working on piece-work, which the workers much prefer, considerably higher earnings were made, exceeding in some cases 30s. per week.

"As a rule, employers of Irish workers in England and Scotland express a high opinion of their capacity as workers.

"The number of agricultural laborers in Ireland has seriously decreased.

"While in some cases wages of agricultural laborers in Ireland reach from 14s. to 16s. per week, and even higher, the average wage, taking the country as a whole, including the value of allowances in kind, is estimated to be from 12s. to 13s. per week.

"The number of farms exceeding 30 acres, on most of which hired labor is required, exceeds 165,000, and embraces three-fourths of the total agricultural area of Ireland. While there has been a considerable increase in the use of agricultural machinery there are many districts where there is little machinery available, and where the work of tillage is carried on almost entirely by manual labor."

The usefulness of rural banks, G. HINEK (*Bol. R. Cattedre Ambul. Agr. Sardegna, 1 (1909), No. 4, pp. 49–52*).—The advantages of cooperation, and especially of the formation of agricultural mutual credit banks, to small holders in Sardinia are pointed out in this article. The chief benefits mentioned are the ability to purchase better and cheaper commercial fertilizers, purer and better seeds, stronger plows and other implements, and the reduction of interest to rates ranging from 5 to 6 per cent, instead of rates ranging from 100 to 200 per cent the small farmer has been accustomed to pay to money-lenders in Sardinia.

The Bank of Spain and agriculture, VISCOUNT DE EZA (*Bol. Asoc. Agr. España, 1 (1909), II, No. 6, pp. 155–169*).—This article discusses the sections of the law which enable the Bank of Spain to extend credit to agricultural associations, gives statistics to prove that with the extension of agricultural credit there has been a rapid increase in the number of such associations, describes the manner in which the associations borrow money of the bank and the limitations of their business relations, and outlines the causes which have operated

to limit the bank in extending credit among the agricultural classes not connected with agricultural associations. As a result, the author believes that the Bank of Spain should be enabled to extend its influence for the improvement of agricultural conditions in Spain by granting credit to the poorer classes of unorganized tenants and farmers, who are greatly in need of such credit at the present time.

Peasants' agrarian bank [in Russia], A. W. Woodhouse (*Diplo. and Cons. Rpts. [London], Ann. Ser., 1909, No. 4370, pp. 15, 16*).—The business operations of the bank are briefly outlined. "Of the total quantity of land belonging to the bank authorized to be sold to the peasants from November 3, 1905, till January 1, 1909, leases were concluded in 14,997 transactions for 1,483,488 acres for the sum of £6,332,453, with loans on the same amounting to £6,167,053.

"In order to enable peasants to purchase land from private owners, with the aid of the bank, authority was given during the above-mentioned period for 20,987 advances to be made on 7,543,962 acres, at the total purchase price of £39,710,104, the loans advanced on the same being £32,817,539.

"Partly on these transactions and partly on transactions previously authorized, 14,628 peasant leases with landowners were confirmed for a total of 5,140,678 acres of land acquired for the sum of £28,168,957, with the help of advances amounting to £23,744,973."

[Cooperative credit societies in Bombay Presidency], G. V. Joglekar (*Ann. Rpt. Work. Coop. Credit Soc. Bombay Pres., 1907–8, pp. 39+3, map 1*).—The operations of the societies during the year are tabulated and discussed in detail. On June 30, 1908, the societies numbered 145, of which 99 were rural and 46 urban, with a membership of 8,477. The rate of interest averaged 9⅝ per cent as compared with 8½ per cent the preceding year (E. S. R., 20, p. 91), while the average charged by money lenders in the presidency is estimated at 18¾ per cent.

The mission, history, and times of the Farmers' Union, C. S. Barrett (*Nashville, Tenn., 1909, pp. 419, figs. 51*).—This volume gives an account of the origin and development of the Farmers' Educational and Cooperative Union, with chapters on the principles and purposes of its organization and the causes which called it into existence in 1902, and discusses the economic advantages to farmers of education and cooperation. The society claims to have 1,000,000 members in the South and West.

The farm community, L. H. Bailey (*Conservation, 15 (1909), No. 10, pp. 627–630*).—This paper calls attention to the nature of community rural life in sections of the country where irrigation is practiced, the dangers of irrigation in destroying soil fertility, and the advantages of irrigation to agriculture under proper conditions even in humid regions.

A statement on the agricultural situation in New York State, L. H. Bailey (*N. Y. Dept. Agr. Bul. 12, pp. 11*).—This bulletin compares the agricultural conditions in the East and the West and points out the present possibilities in the State of New York with reference to general agriculture, forestry, irrigation, and drainage. It is concluded that the State should make "a thorough-going survey in detail of the agricultural possibilities in every township in order that we may have the local facts on which to found a scientifically and economically sound country life."

Agriculture in British Columbia, F. I. Clarke (*Bur. Prov. Inform. [Brit. Columbia], Bul. 10, 9. ed., pp. 103, pl. 1, figs. 13, map 1*).—The agricultural possibilities of this province for the production of fruit, dairying, the live stock industry, poultry raising, and general farming are described in this bulletin. Information is also given on the climatic and physical characteristics of the region, the laws affecting agriculture, and other data of a miscellaneous nature.

Imports of farm and forest products, 1906–1908 (*U. S. Dept. Agr., Bur. Statis. Bul. 76, pp. 65*).—Statistical data of farm and forest products, including the countries from which consigned, are reported. The value of farm products imported for the fiscal year ended June 30, 1908, was $539,690,121, the value of forest products $97,733,092, as compared with $626,836,808 and $122,420,776, respectively, in 1907 (E. S. R., 20, p. 690).

Crop Reporter (*U. S. Dept. Agr., Bur. Statis. Crop Reporter, 11 (1909), No. 12, pp. 81–88; Sup., pp. 89–96*).—These give the yield and condition of crops in the United States and foreign countries, the farm values and range of prices of agricultural products in the United States, the schedule of questions on agriculture in the forthcoming census, and the annual report of the Bureau of Statistics of this Department for the fiscal year 1909.

AGRICULTURAL EDUCATION.

Agricultural education: The United States Department of Agriculture, B. M. Davis (*El. School Teacher, 10 (1909), No. 3, pp. 101–109*).—In this, the first of a series of articles on agricultural education, the author traces the history of agricultural education back to the first organization of associations for the promotion of agriculture in 1785. He then gives an account of the organization of this Department and its rapid growth, and describes the educational work of the Department, calling attention to Department publications and methods of procuring them, the work of the Weather Bureau, Forest Service, and Bureau of Plant Industry in relation to schools, and particularly the work and publications of the Office of Experiment Stations. A bibliography of Department publications is appended.

Agricultural education, B. M. Davis (*El. School Teacher, 10 (1909), No. 4, pp. 163–176*).—In this paper the author describes the work of the U. S. Bureau of Education in relation to instruction in agriculture, quoting from the reports of that Bureau and from the correspondence of the Commissioner of Education to show the attitude of the Commissioner toward agricultural education and toward proposed federal legislation to promote instruction in agriculture in the different States. He also describes state departments of education and their functions and gives a tabular summary showing what has been done in each of the States by legislation or by official encouragement to provide for instruction in agriculture in the public schools and in agricultural high schools. References to literature bearing on this paper are given.

Tables of expenditure for agricultural education (apart from secondary schools and elementary schools) (*London: Bd. Ed., 1909, pp. 13*).—This report explains the relations of the general Board of Education and the Board of Agriculture and Fisheries in the support of agricultural teaching in the universities, independent colleges, and the secondary and elementary schools of England and Wales in the counties named. These have also been previously discussed (E. S. R., 20, p. 201).

Department of agriculture and technical education (*Cairo, Egypt: Min. Ed., 1909, pp. 56*).—Notes on the work of the department and on the schools under its direction and inspection, with lists of the exhibits of the schools at the exhibition of the Khedivial Agricultural Society held at Ghezireh, Cairo, March 3–9, 1909, are presented.

Agriculture (*Ann. Edgar Co. [Ill.] Pub. Schools, 1909–10, pp. 89–104*).—Suggestions are given for the study of weeds, crops, and farm animals, month by month, from October to April, inclusive.

The Saidapeth Agricultural College and Farm, C. Benson (*Agr. Jour. India, 4 (1909), No. 4, pp. 335–343*).—This institution has now, after a check-

ered existence of over 40 years, been closed. A brief historical account of the organization and work of the farm and college is given.

Public school agriculture, A. V. Storm (*Iowa Yearbook Agr. 1908, pp. 84–90*).—In this address the author discusses the need of agriculture in the public schools for the purpose of improving agriculture, for better homes and citizenship, and for better schools. He calls attention to the farmers' institutes, agricultural colleges, and the teaching of agriculture in the public schools as means to bring about improvement in rural conditions, and in discussing the educational value of agriculture in the public schools brings out the fact that the psychologists of to-day agree with the people who are demanding the introduction of agriculture in the public schools, because they believe in the educational value of whatever will help adjust the individual to his environment and enable him to solve the problems of his surroundings.

Normal school instruction in agriculture, M. J. Abbey (*U. S. Dept. Agr., Office Expt. Stas. Cir. 90, pp. 31*).—This circular deals with the purposes and methods of teaching agriculture as the subject has been developed during the past 4 years at the State Normal School, Mayville, N. Dak. Consideration is given to the text-book and laboratory instruction, typical laboratory exercises, apparatus and illustrative material, school garden, practice teaching, excursions, methods of instruction, and the correlation of agriculture with other normal school subjects. The circular contains suggestive outlines for the study of cereals and farm animals and references to the literature found in the normal school library.

Secondary education in agriculture in the United States, A. C. True (*U. S. Dept. Agr., Office Expt. Stas. Circ. 91, pp. 11*).—An address delivered at the 1909 meeting of the Association of American Agricultural Colleges and Experiment Stations, and previously noted (E. S. R., 21, p. 508).

Secondary agricultural education in Alabama, C. J. Owens (*U. S. Dept. Agr., Office Expt. Stas. Bul. 220, pp. 29, pls. 8*).—This bulletin deals with the history, legislation, organization, and equipment of the 9 Congressional district agricultural schools of Alabama, with an estimate of their influence on the agricultural and educational work of the State. It includes the report of committees appointed to formulate a uniform course of study and a plan of experimentation, and a record of some of the more important plat experiments undertaken by the several schools.

The agricultural extension service (*Wisconsin Sta. Circ. Inform. 7, pp. 14*).—A description of the work under way in the different departments of the agricultural extension service of the Wisconsin College and Station, and of the ways in which farmers of the State may secure this service.

A public library on wheels, E. I. Farrington (*Suburban Life, 9 (1909), No. 6, pp. 299, 300, figs. 7*).—A description is given of the work of the library wagon of the Washington County Free Library at Hagerstown, Md. This wagon, in addition to carrying boxes of books to library depositories in different parts of the county, carries 200 books on shelves which are available to every farmhouse along its 16 routes. It is stated that in 1908 3,700 volumes were circulated.

Outlines of agriculture, horticulture, animal husbandry, etc., J. W. Tavenner (*Normal, Ill., 1909, pp. 24*).—The author has prepared this small pamphlet as an aid to pupils as well as teachers of agriculture. It includes outlines of courses in soils, soil fertility, field crops, horticulture, animal husbandry, beekeeping, farm mechanics, the farm home, forestry, and cooking, references to the Farmers' Bulletins of this Department, experiment station bulletins, and other literature being appended to each outlined course.

MISCELLANEOUS.

Twenty-first Annual Report of Kansas Station, 1908 (*Kansas Sta. Rpt. 1908, pp. LV+343–346*).—This includes the organization list, a report of the director and heads of departments, including the Fort Hays, Garden City, and McPherson substations, a financial statement for the fiscal year ended June 30, 1908, and an index to Bulletins 148–155 of the station. The experimental work reported is for the most part abstracted elsewhere in this issue.

Twenty-first Annual Report of Massachusetts Station, 1908 (*Massachusetts Sta. Rpt. 1908, pts. 1, pp. 83; 2, pp. 217*).—Part 1, which is the portion designed for general distribution, consists of papers of a popular nature, based on the results of observations and experiments of the station, and of a brief summary by the director of the more important conclusions from these articles. Part 2 includes the organization list, a report of the director, a financial statement for the fiscal year ended June 30, 1908, reports of heads of departments, and numerous special articles. The experimental work reported in each portion is for the most part abstracted elsewhere in this issue.

Annual Report of Porto Rico Station, 1908 (*Porto Rico Sta. Rpt. 1908, pp. 44*).—This contains in addition to the organization list and a summary by the Special Agent in Charge of the investigations conducted at this station during the year, separate reports of the horticulturist, entomologist, chemist, coffee expert, plant pathologist, and assistant animal husbandman, and an article entitled Notes on the Soils of Porto Rico, which together with the experimental work presented in the various reports is abstracted elsewhere in this issue.

Experiment Station Work, LIV (*U. S. Dept. Agr., Farmers' Bul. 381, pp. 32, figs. 9*).—This number contains articles on the following subjects: Methods and cost of clearing land, tobacco improvement work, calf feeding, gasoline-heated colony brooders, and measuring acidity in cheese making and butter making.

Report of the department of agriculture of Norway, 1908, G. Tandberg (*Aarsber. Offentl. Foranst. Landbr. Fremme, 1908, Statsforanstalt., pp. LVI+661, pl. 1, fig. 23, dgms. 2*).—This is the annual report of the secretary of agriculture, containing reports of agricultural conditions in Norway for the year, and of officials and institutions for the advancement of Norwegian agriculture. Reports of the state entomologist, the chemical and the milk control stations at Christiania, Bergen, and Trondhjem, the cow-testing associations, etc., are included in the volume.

A treatise on general agriculture, E. Leplae (*Traité d'Agriculture Générale, Louvain and Paris, 1908, pp. 688, figs. 84*).—The comprehensive treatise deals with the origin and history of agriculture and systems of culture, the influence of climate on agriculture, the soil, agricultural plants, farm animals, and farm capital, labor, and administration.

NOTES.

Alabama College.—L. N. Duncan, recently transferred from the assistant professorship of agriculture to the professorship of agricultural school work, is making a tour of the State for the purpose of organizing boys' corn-growing clubs. This work has been successfully carried on in Tuskaloosa and Calhoun counties, and will now be extended throughout the State. A leading purpose is to interest the county school superintendents and through them get the work introduced in the rural schools.

Tuskegee Institute.—More than 2,000 farmers and their families attended the annual farmers' conference in January. In connection with the conference a meeting of agricultural workers in the various negro colleges and schools was held for the purpose of forming a permanent association of such workers to consider methods of instruction in agriculture and related topics. The program consisted of papers and addresses on the management of school farms, organization of departments of agriculture in negro schools, experimental work on school farms, agricultural extension work, how to encourage students to take agricultural courses, and the training of teachers of agriculture.

Connecticut State Station.—Donald J. Caffrey, a graduate student of the Massachusetts College, has been appointed assistant in entomology and has entered upon his duties, which for the present will be largely in connection with the gipsy moth campaign. E. M. Stoddard, a graduate student of the Connecticut College, has been appointed assistant in botany.

Georgia Station.—Dr. L. J. Herring has been appointed animal pathologist and veterinarian, and entered upon his duties January 1.

Guam Station.—Considerable progress in clearing station land is reported. During the fall nearly the entire area has been brought under cultivation, roads have been laid out, and fences built. A small plantation of coffee, comprising approximately one acre of hill land, has been established with a view to demonstrating the practicability of cultivating the relatively large areas of land of this class which are now unused. Several acres of newly prepared land have been seeded to forage crops, vegetables, etc., and the general appearance of the station has been considerably improved.

Iowa College and Station.—H. C. Pierce has resigned as poultryman to accept a position with this Department, in connection with its investigations on market poultry. L. G. Michael has resigned as chemist to accept a position with the Russian Government as special expert in connection with corn breeding work in Bessarabia. J. H. Criswell, of the farm crops department, has accepted an appointment as agronomist at the Winona College of Agriculture, at Winona, Ind.; and B. W. Crossley, assistant professor of farm crops, retired January 1. M. L. Wilson has been appointed assistant in farm crops in the extension division.

Kansas College and Station.—A department for the investigation of problems dealing with the handling and milling of grain has been established, with L. A. Fitz, of the Bureau of Plant Industry of this Department, in charge. An

experimental baking plant is to be operated, which will have the twofold purpose of testing the bread-making capacity of flours from different kinds of wheat, and of conducting experiments in the technique of baking. Later it is hoped to erect an experimental mill for use in a study of the milling qualities of wheats and of milling operations.

The new department will cooperate with the entomologist in studies of insects damaging stored wheat and flour in transit, with the botanist to control plant diseases which affect the quality of flour, and with the agronomist in the distribution of improved seed wheat. Much interest is being manifested in the new department, and the millers of the State are actively cooperating in its work.

Hon. T. Blodgett, of Wichita, has been appointed to the board of regents, vice Hon. W. A. Harris, deceased. A. M. Ten Eyck has been appointed director of the Fort Hays Substation, and will enter upon his new duties about June 1. The work at Fort Hays is to be materially enlarged.

Louisiana University.—A two-weeks short course has been held for the first time, beginning January 22. The subjects offered included stock judging and feeding, dairying, forage crops, trucking, corn judging, fertilizers, soils, economic botany and entomology, ornithology, and the common ailments of farm animals. There was a registration of 50, and the course is regarded as so successful that extensive preparations for next year have already been begun.

Minnesota University and Station.—The post-office address of the college and station has been changed to University Farm, St. Paul.

Arrangements have been made whereby 12 demonstration farms of 80 acres each have been established, and plans are being completed for 7 similar farms in addition. The State Federation of Commercial Clubs is actively cooperating in the enterprise, and a special feature is to be the formation of a farmers' club in each locality adjacent to the farms, to hold meetings for the general discussion of farm problems.

E. C. Huntington, who has been connected with newspaper work in the State, has been appointed chief editor of publications in the agricultural extension and home education course, provided by the last legislature. In addition to editing and presenting in popular form the various publications of the college and station, it is planned to devise an elementary course in agriculture and a correspondence course, and to arrange short lectures and demonstrations in various parts of the State. George F. Howard, formerly a county superintendent of schools, has been appointed rural school specialist.

William Robertson, superintendent of the school of agriculture and substation at Crookston, died January 11, at the age of 52 years. Professor Robertson was graduated from Carleton College in 1885, and had also studied at the University of Minnesota. He had had long experience in educational work, serving 8 years as a teacher in rural schools, 4 years as school superintendent, and 15 years as instructor in physics, botany, and other subjects at the college of agriculture. In 1905 he assumed charge of the substation at Crookston, and 2 years later of the newly established school of agriculture. In the 3 years during which the school has been under his guidance it has grown to an attendance of 132, with 9 instructors and modern buildings and equipment.

Theodore D. Urbahns, of the Bureau of Entomology of this Department, has been appointed assistant in entomology.

Missouri University and Station.—The college of agriculture has offered a special two-weeks course in poultry husbandry, with F. H. Stoneburn, of the Connecticut Storrs College and Station, as instructor.

M. F. Miller has been granted a year's leave of absence for study in Europe, to date either from June 1 or September 1. William H. Chandler has been promoted to the grade of instructor in horticulture, and F. H. Demaree and C. B.

Hutchinson to that of instructor in agronomy. John M. Evvard, assistant animal husbandman, has resigned.

Rutgers College.—The short courses in agriculture have been well attended. The additional courses offered this year included farm management, feeds and feeding, agricultural bacteriology, entomology, and horticulture.

New Mexico College and Station.—Wilbur L. Powers, assistant agronomist at the Oregon College and Station, has been appointed in charge of the department of soil physics, vice J. D. Tinsley, whose resignation has been previously noted.

North Carolina State Station.—The division of horticulture has begun issuing a series of horticultural circulars, Circular 1 discussing Pruning Fruit Trees, and Circular 2 How to Plant a Tree.

Rhode Island Station.—John Daniel has resigned as assistant in agronomy to engage in farming, and E. T. Southwick, a graduate of the University of Maine, and J. T. Falconer, a graduate of the New Hampshire College, have been appointed assistants in agronomy. Robert A. Lichtenthaeler, of the Pennsylvania Institute of Animal Nutrition, has been appointed assistant chemist.

South Dakota College.—William White, a 1908 graduate of the University of Minnesota, has been appointed assistant in dairying, and entered upon his duties January 1.

Utah College and Station.—E. H. Walters, assistant chemist, has accepted a position with the Bureau of Chemistry of this Department, and has been succeeded by C. T. Hirst.

Washington College and Station.—George Severance, professor of agronomy and acting head of the department of agriculture in the college and agronomist in the station, resigned January 1 to enter commercial work, as has also H. B. Berry, instructor in agronomy. Director R. W. Thatcher, of the station, has been appointed professor of agricultural chemistry and head of the department of agriculture in the college.

Wisconsin University and Station.—A department of economic entomology has been organized with J. G. Sanders, of the Bureau of Entomology of this Department, as assistant professor in charge. Other appointments include Dr. John Spencer, formerly of the Virginia College, as lecturer in veterinary science, beginning February 1, and McGarvey Cline as director of the forest laboratory.

Office of Experiment Stations.—J. O. Wright, supervising engineer in the Drainage Investigations, resigned February 15, to accept a position as engineer to the State Drainage Commission of Florida, which is charged with the drainage of the Everglade lands. A. E. Morgan, also a supervising engineer, has resigned to enter private practice as a consulting engineer.

William H. Long has been appointed scientific assistant in plant pathology and will be associated with the *Experiment Station Record* in connection with the abstracting of the literature pertaining to bacteriology.

Pennsylvania Railroad Demonstration Farm.—A run-down farm of 50 acres, at Bacon, Del., has been purchased by the Pennsylvania Railroad and is being renovated as a demonstration farm. H. S. Lippincott, a graduate of the college of agriculture of Cornell University, has been appointed superintendent. In addition to the management of the farm it is expected that he will also make addresses at farmers' institutes, granges, and similar gatherings, exhibits, etc. Special attention is to be given to fruit and grass growing, and greenhouses are to be erected for indoor work.

Association of Feed Control Officials.—Following a conference held in Washington, D. C., in September, between a number of state and federal officials and the manufacturers of feeding stuffs, representatives of 12 States and this De-

partment held a meeting in Washington, January 26 and 27, at which a permanent organization was effected under the name of the Association of Feed Control Officials.

The object of the association, as expressed in the constitution adopted, is "to promote uniformity in legislation and rulings, and the enforcement of laws relating to the manufacture, sale, and distribution of commercial feeding stuffs." Membership is to consist of state officials, the Secretary of Agriculture, and heads or chiefs of experiment stations, bureaus, divisions, sections, and laboratories charged by law with the examination of these products or the execution of laws relating to their sale. Officers were elected as follows: President, B. L. Purcell, Virginia; vice-president, E. H. Webster, Kansas; secretary, J. D. Turner, Kentucky; executive committee, the president, the secretary, and L. F. Brown, of New York, W. J. Jones, jr., of Indiana, and P. H. Smith, of Massachusetts.

In addition to the work of organization, a program was presented consisting of addresses and papers relating to the work of the association and various phases of the feed stuffs industry, among the speakers being Secretary James Wilson, of this Department, Dr. H. P. Armsby, Directors E. H. Jenkins, B. W. Kilgore, E. H. Webster, and C. D. Woods, Dr. J. K. Haywood, W. J. Jones, jr., Benjamin L. Purcell, and representatives of several organizations of feed stuffs manufacturers and dealers. A tentative draft of a national feed stuffs law was submitted, and it was decided to make its consideration the chief item of business at the next meeting, in November, to be announced later.

American Society of Agricultural Engineers.—The third annual convention of this society was held December 28 and 29, 1909, at Ames, Iowa, and was well attended.

Among the subjects discussed was the formulation of standards for farm machine construction, similar to the standards set by other engineering societies for the guidance of machine purchasers, and a special committee was appointed to consider this subject and report at the next annual meeting. Among the other papers may be mentioned those on Land Rollers, by H. B. Bonebright, of the Colorado College; A New Six-Stroke Cycle Engine, by M. L. King, of the Iowa Station; and Good Roads, by J. T. Stewart, of the University of Minnesota. The officers chosen were as follows: President, P. S. Rose; vice-presidents, M. L. King and J. B. Bartholomew; and secretary, E. W. Hamilton.

Agriculture at Columbia University.—On Tuesday, January 19, 1910, what is said to be the first lecture at Columbia University on an agricultural topic since Prof. S. F. Mitchell gave up the chair of agriculture in 1804, was delivered by George T. Powell to a gathering of 140 persons in Schermerhorn Hall. This is the first of a series of lectures on economic agriculture to be given by various speakers during the year, and is regarded as the beginning of a plan to develop some form of agricultural school in connection with Columbia University.

Proposed Agricultural Instruction at Syracuse University.—It is announced that the trustees of Syracuse University have decided to establish a college of agriculture and forestry. As a preliminary step there will be organized from facilities already available an agriculture group and a forestry group, drawn especially from the departments of botany, chemistry, engineering, geology (including meteorology), and zoology. These courses will be open to election with the next college year. Temporarily the organization of the new college will be under the direction of Prof. William L. Bray, of the department of botany.

Experiment Station in Palestine.—An organization has been recently incorporated in New York under the title of Jewish Agricultural Experiment Sta-

tion, which has for its object the establishment and maintenance of an experiment station in Palestine. Funds for the enterprise have been furnished by several Jews in this country, Jacob H. Schiff and J. Rosenwald contributing $20,000 for initial equipment, and, together with Paul M. Warburg, I. N. Seligman, I. Straus, and others, guaranteeing a minimum budget of $10,000 for maintenance.

A site has been secured about 7 miles from Haifa, Palestine. A tract of 125 acres of land has already been obtained, and a station building is to be erected.

The station is under the general management of a board of trustees, mainly citizens of this country, the president being J. Rosenwald, of Chicago. Aaron Aaronsohn, a graduate of the agricultural school at Grignon, who has been conducting investigations in Palestine and the surrounding region, will be director.

Both research and practical demonstration work are contemplated, the general object being the improvement of agriculture among the Jewish colonists and farmers of the region. A special line of investigation is to be the wild prototypes of the cereals.

Northwestern and Southwestern Country Life Commissions.—According to a recent number of the *North Pacific Rural Spirit*, a plan is being developed by which the States of Oregon, Idaho, Montana, and Washington may provide for the appointment of a joint commission on country life. In Oregon the members have already been appointed. The report of the Roosevelt Commission has been reprinted voluntarily by the Spokane Chamber of Commerce and at its own expense.

Announcement has also been made of a meeting of the Southwest Interstate Commission on Country Life at Dallas, Tex., May 22 and 23, in which it is expected that delegates from 15 States will participate.

Miscellaneous.—Emile Breal, well known for his contributions to the subject of nitrogen assimilation by leguminous plants, died in Paris, December 21, 1909, in his seventy-third year. He was one of the first to isolate the organism of symbiosis and to conduct inoculation experiments with it in culture. The Academy of Sciences awarded to him the Desmazieres prize in 1889 in recognition of the importance of his work.

Dr. M. Greshoff, well known for his investigations on cyanogenetic glucosids in plants, died in Haarlem, December 8, 1909.

An International Congress of Tropical Agriculture will be held in Brussels, Belgium, in May, 1910. The International Botanical Congress will meet at Brussels at the same time.

A recent number of *La Semaine Agricole* states that Director J. Crochetelle, of the Agricultural Station at Lezardeau, near Quimperle, has been appointed director of the Agricultural Station of Somme, at Amiens.

Prof. R. H. Biffin has succeeded Dr. William Carruthers as consulting botanist to the Royal Agricultural Society of England.

Dr. H. T. Gussow has been appointed botanist to the Dominion Experimental Farms, Ottawa, Canada.

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EXPERIMENT STATION RECORD.

Editor: E. W. ALLEN, Ph. D., *Assistant Director.*
Assistant Editor: H. L. Knight.

EDITORIAL DEPARTMENTS.

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VOL. XXII. ABSTRACT NUMBER. NO. 4.

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

The proteins, T. B. ROBERTSON (*Univ. Cal. Pubs., Physiol., 3 (1909), No. 16, pp. 115–194*).—A digest of data regarding the chemical structure of proteids and their physical properties, the compounds of proteids and their properties, the physical-chemical properties of protein solutions, and the hydrolysis and synthesis of proteids.

The publication, the author states, consists substantially of the Herzstein lectures which he delivered at the University of California in 1908.

Newer contributions to special questions of protein chemistry, E. ABDERHALDEN (*Neuere Ergebnisse auf dem Gebiete der Speziellen Eiweisschemie. Jena, 1909, p. 128*).—This digest of data includes chapters on the total hydrolysis of proteids by acids, a description of different cleavage products, and a summary of information regarding the amino acids contained in certain proteids, and partial hydrolysis and polypeptids.

Recent progress in the chemistry of the proteins, R. H. BRADBURY (*Jour. Franklin Inst., 168 (1909), No. 2, pp. 85–104*).—A digest of data regarding the chemical structure and synthesis of proteids.

The cleavage of proteid by means of dilute mineral acids, A. OSWALD (*Ztschr. Physiol. Chem., 62 (1909), No. 5–6, pp. 492–495*).—Experimental data obtained with iodin albumin are briefly summarized.

The hydrolysis of proteids with hydrofluoric acid and the constitution of proteids, L. HUGOUNENQ and A. MOREL (*Rev. Gén. Sci., 20 (1909), No. 20, pp. 839–845, figs. 2*).—A digest of data. See also a previous note (E. S. R., 22, p. 208).

Researches as to the nature of lactic-acid fermentation, F. HÖRTH (*Versuche zur Erkenntnis der Milchsäuregärung. Diss. Tech. Hochschule Karlsruhe, 1909, pp. 96*).—The results show that certain bodies of diverse composition, such as the aldehydes, ketones, and substances having alcohol groups, are attacked, that the process is not confined to the hexoses but extends to the bioses, a triose, pentoses, and a glucosid, and further, that only those bodies which are optically active are acted upon. The lactic acid produced is mostly of the optically active kind, but always, however, contains small amounts of the racemate. With press yeast, however, an inactive form was produced with a certain carbohydrate, while with others the right or left hand rotary acid was formed. The author attributes this to the occurrence of two lactic-acid enzyms in the same organism.

The influence of acid on the inactivation of rennet by shaking, SIGNE and SIGVAL SCHMIDT-NIELSEN (*Ztschr. Phys. Chem., 69 (1909), pp. 547–556, fig. 1*).—Hydrochloric acid was found to prevent the rendering inactive of rennet action by shaking, while acetic acid had no influence in this regard.

The theory of the function of catalases, O. LOEW (*Arch. Physiol. [Pflüger], 128 (1909), No. 10–12, pp. 560–564*).—A further discussion in regard to the existence and functions of the catalytic enzym.

The action of rennet on paracasein calcium, W. VAN DAM (*Ztschr. Physiol. Chem., 61 (1909), No. 2, pp. 147–163, figs. 2*).—The digestion of paracasein by rennet is dependent upon the content of hydrogen ions in the media. Further, the rapidity of digestion is proportional to the hydrogen ions contained therein, and in this respect resembles the rapidity of coagulation. The rapidity of digestion and coagulation of paracasein lime runs parallel when different rennets of the same acid content are employed. The author contends that paracasein is digested by the chymosin and does not agree with Petry in regard to the presence of a specific enzym for casein in rennet. Sodium chlorid accelerates this digestion.

The state in which calcium exists in milk, P. RONA and L. MICHAELIS *Biochem. Ztschr., 21 (1909), No. 1–2, pp. 114–122; abs. in Molk. Ztg. [Hildesheim], 23 (1909), No. 45, pp. 1270, 1271*).—Although from milk passed through a bisque filter a portion of the calcium is retained, there is a possibility that its state changes as the milk passes over and through the filter and that the retained calcium is not necessarily present in the colloidal or suspended form. In a study of the dissolved calcium a procedure which simulated as nearly as possible natural conditions was devised, by dializing milk against other substances of almost the same composition but of lower or higher calcium content. The solutions employed were rennet whey with a low calcium content and iron whey in which the proteids were precipitated by colloidal iron hydrate and in which the calcium was mostly in insoluble form.

The results obtained showed that the calcium content of the rennet whey increased in the dialysis while that of the iron whey decreased, so that the final calcium content of both wheys differed very little. Dialysis of a small amount of distilled water against a large amount of milk yielded in the former about the same amount of calcium which the latter originally contained. The insoluble calcium content therefore was between the final calcium content of both wheys and in these investigations it fluctuated between 0.06 and 0.07 per cent and was equivalent to 40 to 50 per cent of the total calcium. By precipitating the casein by rennet, the amount of diffusible or soluble calcium was hardly changed. This was also true as to the electrical conductivity and the lowering of the freezing point, and indicates that by coagulating with rennet only such bodies are precipitated as were originally present in a colloidal state. On the contrary, with the iron whey the dissolved calcium was decidedly increased.

It is difficult to say in which form the calcium is present in the milk and it is peculiar that the phosphoric acid content of the iron whey was very low whereas that in the corresponding rennet whey was ten times higher. There was evidently a precipitation of the phosphoric acid by the iron and a rendition of the nondiffusible calcium into a diffusible state. No appreciable amount of colloidal phosphate of calcium can be present in milk, as if this were the case it would be precipitated totally by the iron. It is more certain that the greater portion of the calcium is present as a salt of casein in solution. With raw milk it is often possible to dialize out the calcium quantitatively with running water. Casein probably has the faculty of forming with calcium a soluble and not easily disassociatiable salt. The binding of the calcium by casein was also

shown in that no more coagulation with rennet took place when casein was dissolved in raw milk.

The distribution of nitrogen in cow's, buffalo's, goat's, woman's and ass's milk by acid and rennet precipitation, W. FRIEDHEIM (*Biochem. Ztschr., 19 (1909), No. 1-2, pp. 132-155, pl. 1*).—It is shown by this work that what is characteristic of cow's milk in regard to the distribution of nitrogenous matters in the whey from rennet is also characteristic of goat's, buffalo's, and human milk, this whey containing as much as 10 per cent more soluble nitrogenous bodies than the whey which is obtained by coagulating with acid. Only in the case of ass's milk was it less.

[An ammonia-producing enzym in the silkworm], T. TAKEUCHI and R. INOUE (*Jour. Col. Agr. Imp. Univ. Tokyo, 1 (1909), No. 1, pp. 15-20*).—An enzym was obtained from the silkworm moth which is capable of yielding ammonia from the amino compounds. The greatest bulk of ammonia was produced from asparagin.

Contributions to micro-chemical analysis, N. SCHOORL (*Ztschr. Analyt. Chem., 48 (1909), No. 11, pp. 665-678, 728*).—This is a continuation of work previously noted (E. S. R., 22, p. 8). It considers (pp. 665-678) the sulphates of calcium, strontium, barium and lead, silver nitrate, bromid, iodid and cyanid, the oxids of antimony, iron, chromium, zinc and aluminum, silicic acid and silicates, and a few substances such as Berlin blue, calcium fluorid, sulphur, and graphite. Corrections to the different articles in this series are also given (p. 728).

Total nitrogen determination by the Kober method, F. W. GILL and H. S. GRINDLEY (*Jour. Amer. Chem. Soc., 31 (1909), No. 11, pp. 1249-1252*).—The authors conclude that Kober's aeration method in nitrogen determinations in organic compounds has many advantages over the other distillation methods and can well be used except in instances where magnesium and phosphorus are present together in relatively large amounts. In this case good results can be obtained by keeping the Kjeldahl flask warm during the aerating period.

Determination of small quantities of nitrates, L. FARCY (*Bul. Soc. Chim. France, 4. ser., 5 (1909), No. 14, pp. 775-779; abs. in Jour. Soc. Chem. Indus., 28 (1909), No. 15, p. 849; Chem. Zentbl., 1909, II, No. 13, p. 1078*).—From a study of methods the author concludes that MacGowan's method (E. S. R., 16, p. 949) yields good results in the presence of chlorids but not in the presence of ammonium salts. Frerichs' method (E. S. R., 17, p. 112) in the presence of chlorids gives results 4 or 5 per cent too high and is also without value in the presence of ammonium salts. The method of Grandval and Lajoux as modified by Perrier and Farcy (E. S. R., 21, p. 8) is considered more accurate.

Determination of potash with phosphomolybdic acid, GRETE (*Chem. Ztg., 33 (1909), No. 127, p. 1128*).—The author attempted to determine the potash by precipitation with phosphomolybdic acid, dissolving it in an ammoniacal solution, precipitating with magnesia mixture and titrating the phosphoric acid with Grete's glue-molybdic acid method. The results were not entirely satisfactory.

The detection of arsenic acid in the presence of arsenious acid with magnesia mixture, O. LUTZ and R. SWINNE (*Ztschr. Anorgan. Chem., 64 (1909), No. 3, pp. 298-301*).—The authors conclude from the results of their work that it is well-nigh impossible to obtain a satisfactory separation, either qualitative or quantitative, of arsenic acid from arsenious acid, when present in appreciable amounts, by the usual magnesia mixture method. Solutions of arsenious acids in water or ammonia were found more sensitive toward magnesia mixture than an alkali arsenite, and the presence of much ammonia salt hinders the reaction to quite a degree. If, however, the arsenite is present in certain con-

centrations (less than 1/200 molecule for the usual magnesia mixture or less than 1/50 molecule when much ammonia salt is used) a qualitative separation can be had, but on the other hand the dilution must not be carried so far as to get beyond the detection point of the arsenic ion.

The carbonates of copper and the cupricarbonates, S. U. PICKERING (*Jour. Chem. Soc.* [*London*], *95* (*1909*), *No. 562, pp. 1409–1429, chart 1*).—This work has some reference to the copper compounds as they might exist in Bordeaux mixture.

Phenolphthalein as a reagent for hydrocyanic acid, P. DOBRINER and A. OSWALD (*Ztschr. Analyt. Chem.*, *48* (*1909*), *No. 11, pp. 709, 710*).—By adding to hydrocyanic acid a few drops of an alkaline hydroxid phenolphthalein solution, and then copper sulphate solution (1 : 2,000) a red coloration is obtained, which is due to the oxidation of the phenolphthalein. It is sensitive to 1 : 500,000. Paper impregnated with phenolphthalein copper solution is also colored red by hydrocyanic acid.

A characteristic reaction for free tartaric acid, A. TAGLIARINI (*Bol. Chim. Farm.*, *46* (*1907*), *pp. 493–495; abs. in Ztschr. Untersuch. Nahr. u. Genussmtl.*, *18* (*1909*), *No. 8, p. 470*).—The author reports that the reaction proposed by Ganassini for tartaric acid can also be obtained with oxalic and citric acids, but not with formic, acetic, and succinic acids.

Formaldehyde, J. E. ORLOFF, trans. by C. KIETAIBL (*Formaldehyd. Leipsic, 1909, pp. VIII+327, pls. 3, figs. 9*).—This is a comprehensive volume of most of the important facts pertaining to formaldehyde, and includes the various processes of production, the reactions for formaldehyde, its uses, analyses, the conversion of methyl alcohol into formaldehyde, the new condensation products of formaldehyde, the pyrogenetic contact reactions, and the methods for the detection of formaldehyde.

[Methods of analysis of fertilizers and feeding stuffs for 1908 by the Board of Agriculture and Fisheries] (*Analyst*, *34* (*1909*), *No. 403, pp. 461–468*).—This is a description of the methods of analysis of fertilizers and feeding stuffs agreed upon by the Board of Agriculture and Fisheries.

Note on a rapid method of analysis of waters, L. MARCOTTE (*Ann. Observ. Munic.* (*Observ. Montsouris*) [*Paris*], *9* (*1908*), *No. 3–4, pp. 339, 340*).—A quick fermentation method is described.

The determination of chlorid of magnesium in water, H. EMDE and R. SENST (*Ztschr. Angew. Chem.*, *22* (*1909*), *No. 42, pp. 2038–2040*).—The authors find that Pfeiffer's method for determining magnesium chlorid by noting the content of chlorin in the water before and after incineration of the ash does not give satisfactory results, and conclude that the only way to obtain correct results is to make the usual analysis.

[The determination of chlorid of magnesium in water], PFEIFFER (*Ztschr. Angew. Chem.*, *22* (*1909*), *No. 42, p. 2040*).—A reply to the above.

The determination of magnesium chlorid in water, H. EMDE and R. SENST (*Ztschr. Angew. Chem.*, *22* (*1909*), *No. 46, pp. 2236–2238*).—A reply to Pfeiffer (see above), with some tests to prove the authors' former conclusions.

The interpretation of chemical water analysis, H. KLUT, trans. by E. A. GIESELER (*Engin. Rec.*, *60* (*1909*), *No. 18, pp. 498–500*).—This is a translation of an article already noted from another source (E. S. R., 21, p. 521).

Colorimetric method for the determination of molecular weights of carbohydrates (starch, glycogen, dextrins), L. WACKER (*Ber. Deut. Chem. Gesell.*, *42* (*1909*), *No. 12, pp. 2675–2680; abs. in Jour. Soc. Chem. Indus.*, *28* (*1909*), *No. 16, p. 898*).—The basis of the method is the coloration produced by an alkaline solution of phenylhydrazinsulphonic acid, this being constant for equimolecular concentrations of various carbohydrates. The color standards

are prepared from a thousandth-normal dextrose solution, or, still better, from maltose.

A method for determining different sugars in a mixture of sugars, H. C. GEELMUYDEN (*Ztschr. Analyt. Chem., 48 (1909), No. 3, pp. 137–163; abs. in Ztschr. Untersuch. Nahr. u. Genussmtl., 18 (1909), No. 8, p. 469*).—This procedure has its application chiefly for diabetic urine, and consists of a combination of the various methods of sugar determination, that is, titration (T), polarization (P), fermentation, etc.

The first experiments in this direction were with glucose and maltose and with fructose, maltose, and glucose. The constants of the evolved formulas were calculated from polarimetric determinations and from the reducing values obtained by Knapp's method. Thus there was obtained for glucose (G) and fructose (F) the formula: F=0.355 (T−P), G=0.378 P+0.622 T; for maltose (Ma) and fructose: Ma=0.270 P+0.444 T, F=0.663 T−0.169 P; for glucose and maltose: Ma=0.511 (P—T), G=1.337 T—0.337 P, Ma=0.639 ($P—P_1$), Ma=2.556 (T_1—T); if the maltose is determined by inversion: G=T_1—1.053 Ma=P_1—1.053 Ma. The researches were done with pure sugar solutions and urines. The results were found to be very accurate. The author will report on his tests with the pure yeast species fermentation tests at a later date.

A simple method for the quantitative determination of reducing sugars, J. DUSCHSKY (*Deut. Zuckerindus., 34 (1909), No. 26, pp. 521, 522; abs. in Ztschr. Angew. Chem., 22 (1909), No. 34, p. 1694*).—Comparative tests of the various methods for reducing sugars showed that M. Müller's, in which the precipitated cuprous oxid is oxidized with iron oxysulphate and the remaining oxysulphate determined by titration with potassium permanganate, is the best.

The quantitative determination of starch sirups, R. KAYSER (*Ztschr. Öffentl. Chem., 15 (1909), No. 20, pp. 390–393*).—Juckenack and Pasternack's method for the determination of starch sirups in food does not in all instances yield reliable results.

Detection of cane sugar and glucosids in plants, H. MÜHE (*Ztschr. Analyt. Chem., 48 (1909), No. 11, pp. 718–721*).—A description of methods to detect these substances by means of enzyms.

Sugar determination in molasses feeds, L. VUAFLART (*Jour. Fabric. Sucr., 50 (1909), No. 27, p. 1; abs. in Chem. Ztg., 33 (1909), No. 93, Repert., p. 404*).—The newer methods, together with that of Herles, use the polariscopic method after clarifying with lead acetate. Lead acetate often does not precipitate certain optically active plant substances, and it was found that the error may be as much as 50 per cent. It was often necessary to determine these sugars after inversion with copper solution or to extract them with alcohol and determine according to Clerget's method.

The analysis of galactose, A. FERNAU (*Ztschr. Physiol. Chem., 60 (1909), No. 3–4, pp. 284–288; abs. in Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. ser., 4 (1909), No. 19, p. 743*).—This is a modification of the Tollens method. It consists of taking 5 gm. of galactose in a tared glass receptacle, adding 60 cc. ammonia and concentrating to a bulk of 15 to 16 cc. After adding 40 cc. of water and allowing the mixture to stand for 12 hours the sediment is filtered off and dried to constant weight. Pure galactose by this procedure yields 70 per cent of mucic acid.

Quantitative analysis of glycogen and the unique character of liver substances, E. PFLÜGER (*Arch. Physiol. [Pflüger], 129 (1909), No. 6–7, pp. 362–378*).—A controversial article, dealing especially with the methods of glycogen determination as proposed by Abderhalden (E. S. R., 22, p. 9).

The determination of gum in sirups, A. AUGUET (*Ann. Falsif., 2 (1909), No. 5, pp. 136–138*).—This is a combination of the Meyer and Roussin methods and

consists of precipitating 25 gm. of sirup with 5 cc. of perchlorid of iron, collecting the gum on the flannel filter, dissolving it in fifth-normal hydrochloric acid and water, and reprecipitating with 12 to 15 times its volume of 95 per cent alcohol. The precipitate is collected on a tared filter, dried, and weighed. The weight multiplied by 40 gives the amount of gum per liter of sirup.

The determination of starch, BUISSON (*Bul. Assoc. Chim. Sucr. et Distill., 26 (1909), No. 10, pp. 980–983; abs. in Rev. Gén. Chim., 11 (1909), No. 17, pp. 353, 354*).—This is a modification of Baudry's method, in which 5.41 gm. of the finely ground material is taken, 25 cc. of a saturated solution of picric acid and 100 cc. of water added, and the mixture boiled for 45 minutes in a bath of calcium chlorid. The flask is then filled up to the 200 cc. mark and the solution filtered and polarized in a 400 mm. tube.

Determination of starch in barley, O. NEUMANN (*Wchnschr. Brau., 26 (1909), No. 25, pp. 306–309; abs. in Ztschr. Angew. Chem., 22 (1909), No. 34, p. 1695*).—A compilation of the various newer methods for the estimation of starch in barley.

The determination of phosphorus in foods, feces, and urine, F. W. GILL, J. B. PETERSON, and H. S. GRINDLEY (*Proc. Amer. Soc. Biol. Chem., 1 (1909), No. 4, p. 159*).—This is a comparative study of methods for total inorganic and organic phosphorus determination in flesh, etc.

It was found that the magnesium nitrate, nitric acid, Kjeldahl, nitric and hydrochloric acids, and direct ashing methods gave practically the same results. It was further shown that barium nitrate in the presence of ammonium hydroxid, or barium hydroxid alone, precipitated from an aqueous extract of meat containing no coagulable protein the same amount of inorganic phosphorus as does the method of Hart and Andrews (E. S. R., 15, p. 428).

Taking economic factors into consideration, tests were made with the nitric-hydrochloric acid digestion method, which was found to convert all the phosphorus into a form from which it can be precipitated as molybdate. Comparative tests with urines of the uranium acetate solution (volumetric method) and the nitric-hydrochloric acid method showed that the former gave somewhat lower results.

Method for the detection of small amounts of water in lard (*Ztschr. Untersuch. Nahr. u. Genussmtl., 18 (1909), No. 7, Beilage, pp. 387–389*).—This is the official test used by the treasury department of the German Government.

Ten gm. of fat is brought into a transparent glass tube 9 cm. long and with a capacity of 18 cc., which can be stoppered and in which a thermometer is inserted which dips into the fat. When the tube is heated to 70° C., if the fat is clear the water content, it is concluded, is below 0.3 per cent. If it is cloudy at 70° it is heated up to 95°, allowed to cool gradually, and the temperature determined at which cloudiness sets in. If this is found to be constant at over 75° the lard contains more than 0.3 per cent of water.

The cholesterin content of eggs, H. CAPPENBERG (*Chem. Ztg., 33 (1909), No. 112, p. 985*).—The fact that lecithin is easily decomposed makes it an uncertain constant for judging bakery products containing eggs, and the author suggests employing the cholesterin content in its stead. A series of analyses showed that the fatty egg oils contain an average of 3 per cent of cholesterin, and therefore that eggs with an average content of 12 per cent of fat have about 0.36 per cent cholesterin.

A method for determining cholesterin is appended.

Color reaction for gelatin, R. E. LIESEGANG (*Ztschr. Chem. u. Indus. Kolloide, 5 (1909), No. 5, p. 248*).—If diffusion streams consisting of a 40 per cent tricalcium phosphate and a 10 per cent copper chlorid solution are allowed to

meet in a gelatin jelly strata there ensues a deep violet color with no turbidity.

Detection of traces of chlorids in commercial gelatin, R. E. LIESEGANG (*Ztschr. Chem. u. Indus. Kolloide, 5 (1909), No. 5, pp. 249, 250*).—Slight traces of chlorids in gelatin can not be detected by the addition of silver nitrate. The author proposes taking a 10 per cent solution of gelatin, allowing it to solidify on a glass plate, and then adding several drops of a 10 per cent silver nitrate solution in the same manner as described in his work with jellies. The reaction only becomes apparent after a time, when at the periphery of the drop there appears at first a turbidity which gradually becomes greater until it may reach a diameter, according to the size of the drop, of 1 to 2 cm.

The recognition of flour adulterations by the serum method, W. MAGNUS (*Landw. Jahrb., 38 (1909), Ergänzungsb. 5, pp. 207–215; abs. in Chem. Zentbl., 1909, II, No. 11, p. 936*).—The author describes a method to utilize the precipitin reaction to detect adulterations of flour with products from closely related plants and nonrelated plants. In the case of closely related plants, rye and wheat, the specificity was good. Three per cent of rye in wheat flour could be easily recognized.

The ash content of honey, A. RÖHRIG (*Ber. Chem. Untersuch. Anst. Leipzig, 1908, p. 34; abs. in Ztschr. Untersuch. Nahr. u. Genussmtl., 18 (1909), No. 8, p. 482*).—Pure honeys had an ash content between 0.068 and 0.284 per cent. The average of 38 samples was 0.136 per cent. In artificial honey it was not always under 0.1 per cent and in fact in four cases it was from 0.18 to 0.292 per cent. Judging honey on these grounds may often lead to error.

[Qualitative and quantitative methods for] the detection and determination of sulphurous acid in lime juice, E. DOWZARD (*Amer. Jour. Pharm., 81 (1909), No. 12, pp. 561–564*).—The official qualitative method (E. S. R., 19, p. 506) is modified by adding phosphoric acid to the reagents, distilling off 50 cc. of the juice, and collecting the distillate in a 1 per cent solution of sodium bicarbonate. The modified quantitative method consists in shaking out with chloroform the essential oil from this distillate, and titrating the aqueous portion in the usual manner.

A rapid method of determining sulphurous acid in wine, DUJARDIN (*Feuille Vin. Gironde, 34 (1909), No. 46, p. 184, fig. 1*).—A specially constructed volumetric tube termed "the sulphuro-oenemetric tube" is used. The reagents employed are a solution of iodin, potash, starch, etc. The results are given in milligrams per liter.

The determination of ethereal oil and eugenol in cloves, R. REICH (*Ztschr. Untersuch. Nahr. u. Genussmtl., 18 (1909), No. 7, pp. 401–412, fig. 1*).—The best cloves have a high oil and eugenol content, but the essential oils from them show a lower percentage of eugenol than those obtained from inferior cloves and clove powders, the reason for this being that the former oils contain more esters and ketones. The author, therefore, considers the determination of eugenol important.

On analysis Amboina cloves were found to contain 21.3 to 22.1 per cent of oil, whereas Zanzibar cloves contained 18.4 to 20.1 per cent. The respective eugenol contents were 17 to 17.6 per cent and 15.4 to 16.6 per cent. With pure ground commercial cloves the oil content fluctuated between 17 and 19.3 per cent and that of eugenol between 15.5 and 16.3 per cent. Clove stems showed only 5.8 to 6.7 per cent of oil and 5.4 to 5.7 per cent of eugenol. Examination of oils distilled by the author gave a minimum eugenol content of 79 per cent and a maximum of 87.9 per cent.

The determination of gingerol in ginger, H. GARNETT and J. GRIER (*Pharm. Jour. [London], 4. ser., 29 (1909), No. 2389, pp. 159, 160; abs. in Analyst, 34 (1909), No. 403, p. 441*).—The authors state that anhydrous ether is probably the best extractive for gingerol. The subsequent treatment of the ginger consists of evaporating off the ether, extracting the residue several times with different portions of petroleum spirit, filtering the solution, evaporating again, and extracting with 60 per cent alcohol. The gingerol is then shaken out with ether or bisulphid of carbon, using a drop of dilute hydrochloric acid to prevent possible emulsification.

Starch in table mustard, E. COLLIN (*Ann. Falsif., 2 (1909), No. 7, pp. 206-215, figs. 7*).—A study of microscopical methods for mustard to which starch has been added.

Tests to distinguish between vanillin and coumarin, J. KAHN (*Amer. Drug., 53 (1908), No. 1, p. 5; Schweiz. Wchnschr. Chem. u. Pharm., 47 (1909), No. 30, p. 463; Pharm. Zentralhalle, 50 (1909), No. 44, p. 916*).—Three tests are proposed, as follows: (1) An aqueous solution of vanillin gives a blue coloration with ferric chlorid, changing to brown on boiling and to a white precipitate on cooling; (2) on the addition of 1 cc. of sulphuric acid to 0.1 gm. of vanillin in 1 cc. of acetic acid a green-blue color is obtained; (3) 0.1 gm. of vanillin in alcohol yields with 1 cc. of sulphuric acid a green coloration, which on heating changes to a wine-red and finally to a violet. Coumarin does not give any of the above reactions.

Vanilla v. vanillin, M. TIFFENEAU (*Rev. Sci. [Paris], 47 (1909), II, No. 20, pp. 622-626*).—A description and discussion of these products from the various view points.

[Detection of saccharin], F. A. GENTH, Jr. (*Amer. Jour. Pharm., 81 (1909), No. 11, pp. 536, 537*).—The residue from the ethereal extract, when free from salicylic acid, is taken up with 1 cc. of water, made slightly alkaline with ammonia, and evaporated to dryness. Then a drop or so of water and a piece of sodium hydroxid are added, and the whole evaporated to dryness and gradually fused. After cooling 1 cc. of water is added to the mass, the greater portion of the alkali is neutralized with hydrochloric acid, 1 to 2 drops of a 1 per cent iron alum solution is added, and the remaining alkalinity neutralized carefully. If saccharin is present a violet color is obtained.

An apparatus for detecting hydrofluoric acid in foods, H. ROSSET (*Ann. Chim. Analyt., 14 (1909), No. 10, pp. 365, 366, fig. 1*).—This consists of a lead flask in which the fluorin (isolated as barium or calcium compounds) is placed with 5 to 10 cc. of sulphuric acid. Upon the flask is a disk of glass which serves as the surface to be etched, and upon this is placed a metal condenser so arranged that the water going through it acts as a cooling surface for the glass disk. Two hours' heating on a hot plate are required for the test. Very small amounts of fluorin can be detected in this way.

Total solid determination in milk, F. ZILLIKENS (*Pharm. Ztg., 54 (1909), No. 34, p. 336; abs. in Milchw. Zentbl., 5 (1909), No. 7, pp. 317, 318*).—The following methods were investigated: Fleischmann's formula, Hinard's method, Revis's method, and one in which 10 cc. of milk plus 5 to 6 drops of acetic acid (15 per cent) is evaporated on the water bath oven to constant weight. The method of Revis seemed to be the best on account of the rapid drying, its results agreeing with those obtained by Fleischmann's formula. The ease with which the dishes can be cleansed was also a factor in its favor.

The indirect determination of total solids in milk, D. GIRIBALDO and A. PELUFFO (*Monit. Sci., 4. ser., 23 (1909), II, No. 812, pp. 489-499; abs. in Ztschr. Angew. Chem., 22 (1909), No. 42, p. 2054*).—The formula is as follows where E=the dry substance, D=the density, B=the fat: $E=282\ (D-1)+1.19\ B.$

For the fat-free dry substance (P), therefore, $P=282\ (D-1)+0.19\ B$. For the percentage of fat in the dry substance (M) the formula is as follows:

$$M=84-\frac{23{,}700}{282+1.19\frac{B}{(D-1)}}.$$

Fat content and specific gravity of milk solids, WITTE (*Ztschr. Untersuch. Nahr. u. Genussmtl., 18 (1909), No. 8, p. 464*).—The author made the observation that the fat content of the dry substance (p) stands in a definite relation to the specific gravity of the milk-dry substance (m), thereby enabling the direct calculation of the latter. A table is presented giving the specific gravity corresponding to various percentages of fat, there being a decrease of 0.01 per cent in the specific gravity for every increase of 1.1 per cent of fat. These factors only apply to conditions in which the fat content is between 20 and 32 per cent, as outside of these limits the calculation must be made by the usual method.

Hart's casein test, F. T. SHUTT (*Canada Expt. Farms Rpts. 1909, pp. 192, 193*).—A comparison of this test (E. S. R., 19, p. 707) and the ordinary chemical method gave the following results: Out of 7 samples Hart's test yielded in 2 cases 0.1 per cent less than the chemical test, in 2 other cases 0.1 to 0.2 per cent less, and in the remaining 3 cases between 0.2 and 0.3 per cent less.

The nitrogen factor for casein, H. D. RICHMOND (*Analyst, 33 (1908), No. 386, pp. 179–184; abs. in Molk. Ztg. [Hildesheim], 23 (1909), No. 42, p. 1191*).—After calculating the results to fat, ash, and aldehyde-free casein, the factor 6.39 was obtained. Comparing the Kjeldahl with the Dumas method, the author concludes that the former furnishes the more accurate results.

[The relation between the protein and the aldehyde figure of milk], H. D. RICHMOND (*Analyst, 33 (1908), No. 385, pp. 114–116; abs. in Molk. Ztg. [Hildesheim], 23 (1909), No. 42, p. 1191*).—The author believes that the aldehyde figure can be employed as a rapid method for the determination of nitrogenous bodies in milk. According to his investigations the aldehyde figure multiplied by 0.171 gives approximately the protein content of the milk, providing that strontium hydroxid is used in the titration. For woman's milk the factor is 0.136. The factor 0.171 is not applicable to milk preparations.

The sin-acid and sal method for the determination of fat in milk, K. WINDISCH (*Milchw. Zentbl., 5 (1909), No. 8, pp. 344–352*).—With fresh milk both methods yielded good results, the difference seldom being over 0.1 per cent. The results attained also agreed well with Gerber's sulphuric acid method, except that with milks having a high fat content the alkali method differed markedly in its results. Milks preserved for several weeks by potassium bichromate did not give good results when tested with the sin-acid and sal methods, and indicated that these methods are inapplicable for such milks. The sulphuric acid method, on the contrary, yielded good results.

[The alcohol test with milk], A. AUZINGER (*Milchw. Zentbl., 5 (1909), Nos. 7, pp. 293–315; 8, pp. 352–370; 9, pp. 393–411*).—The author concludes that the alcohol reaction with fresh milk is not dependent upon the amount of acid present but is probably caused by a transference of the calcium in its relation to the protein substances. This, however, does not apply to colostrum. It is thought that the positive test occurs much more frequently than indicated by Henkel. The alcohol test combined with the leucocyte test, Koning catalase test, and the Schardinger reaction is considered a good means for the hygienic control of milk.

On Jaffé's colorimeter method for the estimation of creatinin, A. C. CHAPMAN (*Analyst, 34 (1909), No. 404, pp. 475–483; Chem. News, 100 (1909), No. 2602, p. 175*).—Several suggestions are made for the satisfactory carrying out of this method.

On the estimation of purin bases in urine, E. L. KENNAWAY (*Jour. Physiol.*, *39* (*1909*), *No. 4*, *pp. 296–310*).—According to the author's summary, "uric acid, when treated by the Camerer-Arnstein method for the estimation of the total purins of urine, loses nitrogen in the form of ammonia. The formation of ammonia occurs when the precipitate of silver-magnesium urate is boiled.

"The purin bases which were examined were found not to undergo this loss."

A simple, rapid, and accurate method for the determination of ammonia and acetone in urine, R. W. KING (*Jour. Amer. Med. Assoc.*, *53* (*1909*), *No. 21*, *pp. 1738–1740*, *fig. 1*).—The author outlines a method for clinical purposes which he considers satisfactory.

A method for the estimation of urea, allantoin, and amino acids in the urine, DOROTHY E. LINDSAY (*Bio-Chem. Jour.*, *4* (*1909*), *No. 9*, *pp. 448–454*).—A critical study of methods.

The chemistry of food fat in the intestinal tract, A. ROUSSELET (*Jour. Pharm. et Chim.*, *6. ser.*, *30* (*1909*), *No. 2*, *pp. 60–66*).—An improved method of extracting fat from feces, which insures the removal of the soaps, is described. This is brought about by extraction with ether, treatment with alcohol containing hydrochloric acid, and extracting again with ether. Comparative data are reported.

The analysis of beeswax, H. RYAN (*Sci. Proc. Roy. Dublin Soc.*, *n. ser.*, *12* (*1909*), *No. 21*, *pp. 210–215*).—Samples of beeswax gathered from different parts of the world showed a practically constant composition. The suggestion of the author and Hehner to determine the purity of beeswax, or beeswax in complex mixtures, by determining the molecular weight of the free acids and assuming that the molecular weight of cerotic acid is higher than any others which may be present in beeswax, is not found to hold good in every instance. It is shown that by melting together Montana wax, the acids of which have a higher molecular weight, and stearin, a wax could be obtained which furnishes practically the same figures as beeswax and differs only in regard to the melting point.

A rapid method for detecting stearin and other glycerids in beeswax, A. OSTROGOVICH and Mlle. S. PETRISOR (*Bul. Soc. Sti. Bucuresti*, *18* (*1909*), *No. 2–4*, *pp. 127–130*; *abs. in Analyst*, *34* (*1909*), *No. 404*, *p. 495*).—This method is based upon the fact that acrolein is produced by acting upon the liberated glycerids with zinc chlorid and may be detected by means of Barbet and Jandrier's reagent, which is a 30 per cent solution of phloroglucinol in sulphuric acid. With this method it is possible to detect the presence of 5 per cent of stearin in beeswax, although such a mixture analyzed according to the usual method will not show the adulteration.

The calorific value of beeswax, N. SOKOLOV (*Zhur. Russ. Fiz. Khim. Obshch.*, *37* (*1905*), *I*, *No. 7*, *pp. 818–822*; *abs. in Ztschr. Analyt. Chem.*, *47* (*1908*), *No. 6–7*, *p. 441*; *Chem. Centbl.*, *1906*, *I*, *No. 5*, *p. 394*).—Beeswax from various sources gives a constant in the neighborhood of 10,312 calories. This is due to the fact that the calorific value of cerotic acid and palmitic acid myricylic ester are almost alike. The caloric value of paraffin and ceresin, on the other hand, is on the average 11,234 calories, and for every per cent of these bodies added to beeswax the calorific value rises 9.2 calories.

The determination of the saponification number and the free-fatty acids and neutral fats in dark fats and oils, C. STIEPEL (*Seifenfabrikant*, *29* (*1909*), *pp. 509*, *534*; *abs. in Pharm. Zentralhalle*, *50* (*1909*), *No. 44*, *p. 916*).—This method is based on the fact that chlorid of barium takes down the coloring matter during the formation of barium soap.

Tunis olive oils and the special reactions, R. MARCILLE (*Ann. Falsif.*, *2* (*1909*), *No. 7*, *pp. 224–230*; *abs. in Chem. Zentbl.*, *1909*, *II*, *No. 13*, *p. 1084*).—

Certain Tunis olive oils give color reactions with furfurol hydrochloric acid, but these are different from those obtained with oils which contain minute amounts of sesame oil, and further, these oils react to Bellier's test. Washing the oils with sodium bicarbonate removes the reacting bodies. When rancidity sets in the reaction also disappears.

The furfurol reaction for detecting sesame oil, L. DURAND (*Ann. Falsif., 2 (1909), No. 9, pp. 317–319*).—The Villavecchia-Fabris reaction at times gives erroneous results with certain Algerian olive oils. When modified as recommended by Milliau and Marcille the results obtained are better.

New characteristic reaction of oil of sesame, P. GUARNIERI (*Staz. Sper. Agr. Ital., 42 (1909), No. 4–6, pp. 387, 388*).—Two or 3 drops of a reagent consisting of an ethereal solution of hydrogen peroxid are added to 1 cc. of the oil in question and a double volume of nitric acid. Upon agitating the mixture strongly for a few seconds and allowing a separation to take place, a green-blue color indicates the presence of oil of sesame.

The thermal degree and the thermoleometer, M. TORTELLI (*Gaz. Chim. Ital., 39 (1909), II, No. 1, pp. 71–100, figs. 2*).—The thermal degree consists of an accurate determination of the Maumé figure with the author's thermoleometer. The determination of this constant accurately is of particular value for detecting adulterations in edible oils and fats, as each oil or fat, or a mixture of them, has a different thermal degree. Olive oil, for instance, has a lower thermal degree than any of its usual adulterants.

Tables are given which show the thermal degrees of the different animal and vegetable oils and fats, and the ratio between these and the iodin number.

A new form of polarimeter for the measurement of the refractive index of opaque bodies, W. F. BARRETT (*Sci. Proc. Roy. Dublin Soc., n. ser., 12 (1909), No. 19, pp. 198–201, figs. 2*).—This is a newly devised polarimeter which can be employed for opaque liquids and solids which have an angle of polarization lying between 48 and 68°.

Standardizing chemical apparatus at the Belgian measure and weight bureau (*Ztschr. Angew. Chem., 22 (1909), No. 46, pp. 2235, 2236*).—Directions and requirements in regard to the standardization of chemical apparatus are given.

Yearbook of chemistry, edited by R. MEYER ET AL. (*Jahrb. Chem., 18 (1908), pp. XII+587*).—A report of the most important additions in pure and applied chemistry during the year 1908.

Yearly report on agricultural chemistry, T. DIETRICH (*Jahresber. Agr. Chem., 3. ser., 11 (1908), pp. XXXVI+656*).—This is a report of the progress in agricultural chemistry for the year 1908. It includes practically all the important advances in agricultural chemistry and the allied sciences.

Yearly report of the progress in the examination of foods for 1908, H. BECKURTS (*Jahresber. Nahr. u. Genussmtl., 18 (1908), pp. 205*).—This is a compilation of the progress made in food chemistry and closely allied subjects throughout the world for the year 1908. It includes a description and discussion of the newer and modified methods for food analysis, a discussion of the results obtained, and recommendations for the interpretation of results of the analyses of the different food materials.

Report of the state dairy, food and oil commissioner of Wyoming (*Ann. Rpt. Dairy, Food and Oil Comr. Wyo., 5 (1909), pp. 112, pls. 6*).—This is the fifth annual report and is for the year ended October 1, 1909.

Report on the work of the Lille Municipal Laboratory during the year 1908, A. BONN (*Ann. Falsif., 2 (1909), No. 12, pp. 439–443*).—Data are given regarding the scope and extent of the analytical work carried on at this laboratory.

Cane sugar and its manufacture, H. C. PRINSEN GEERLIGS (*Manchester, 1909, pp. XI+350+XII*).—As stated in the preface, the object of this work is to compile in one book everything that is known about the chemistry and technology of sugar cane and cane sugar manufacture. It is primarily for the chemist and avoids technical discussions of machinery, although describing the different processes of manufacture. The nomenclature of Emil Fischer for the different carbohydrates is used throughout.

Conversion of sulphurous acid into sulphuric acid in sugar products, SAILLARD and WEHRUNG (*Abs. in Deut. Zuckerindus., 34 (1909), No. 44, p. 843*).—It is shown that sulphuric acid is produced during the manufacturing process, and further, that the amount is dependent upon the amount of air admitted with the sulphurous-acid gas to the sugar solution.

Manufacture of corn starch and its by-products in the United States (*Génie Civil, 55 (1909), No. 13, pp. 240–242, fig. 1; abs. in Chem. Ztg., 33 (1909), No. 103, Repert., p. 446*).—A description of the manufacture of these products, with statistics indicating the amounts of these products, particularly corn oil, which are exported to Europe.

The storage and shipping of honey, WEIGERT (*Leipzig. Bienen Ztg., 24 (1909), No. 8, pp. 120–122*).—A description of practical methods for the storage and shipment of honey.

Calcium hypochlorite in cider making, H. ALLIOT and G. GIMEL (*Compt. Rend. Acad. Sci. [Paris], 149 (1909), No. 12, pp. 532–534*).—A series of experiments from 1905 to 1909 indicated that calcium hypochlorite can be employed to advantage in cider making. It is of particular value when the apples are dirty, as the preliminary washing of such apples in hypochlorite solution prevents abnormal fermentation of the must. Calcium hypochlorite also has a favorable effect upon the ultimate clarification of the beverage, particularly as it brings about a rapid deposition of the pectic substances and a coagulation of some of the other bodies, and further is decidedly fungicidal toward malferments. When pure yeasts are used it is of exceptional value in the conservation of the purity of the yeast. The amounts of calcium hypochlorite employed do not increase the mineral constituents materially.

Chemical changes affecting quality of canned goods, E. W. DUCKWALL (*Canner and Dried Fruit Packer, 29 (1909), No. 21, pp. 24, 26, 27*).—A popular article on the chemistry of canned goods.

Sterilizing by intermittent processing, E. W. DUCKWALL (*Canner and Dried Fruit Packer, 29 (1909), No. 17, pp. 24, 26–28*).—A theoretical and practical discussion of this method of processing.

Oil production at the French and Italian Riviera, J. SLAUS-KANTSCHIEDER (*Ztschr. Landw. Versuchsw. Österr., 12 (1909), No. 7, pp. 561–585, fig. 1*).—This is a discussion in regard to the production of olive oil in these localities. Reference is made to the methods of producing the oil and there is a very general description of the machinery.

About the processes of leather formation, W. FAHRION (*Ztschr. Angew. Chem., 22 (1909), Nos. 43, pp. 2083–2097; 44, pp. 2135–2144; 45, pp. 2187–2194*).—A consideration of the various chemical processes which occur in the conversion of hide into leather.

METEOROLOGY—WATER.

Meteorology.—Part I, Statical meteorology, A. KLOSSOVSKIĬ (*Meteorologhiya. Chast I, Statīcheskaya Meteorologhiya. Odessa, 1908, pp. XI+642, pls. 9, figs. 197; rev. in Mitt. Justus Perthes' Geogr. Anst., 55 (1909), No. 1, Lit. Ber., pp. 17–19; Nature [London], 81 (1909), No. 2080, pp. 303, 304*).—The com-

plete treatise, of which this is part 1, will be in four parts. The reviewer in *Nature* considers this first volume very complete and up-to-date. He states that "in no other treatise are the questions relating to underground temperature expounded in so complete a manner. The discussion of the results of the author's observations on the temperature at different depths in soil covered with grass and otherwise is especially noteworthy."

The titles of the chapters in this volume are as follows: Composition of the atmosphere, physical properties, water in the atmosphere, the oceans, solar radiation, terrestrial radiation, earth temperature, increase of heat with depth, ocean temperatures, temperature of the lower strata of the atmosphere, atmospheric pressure, formation of hydrometeors, temperature and pressure in the upper atmosphere, [and] abnormal departures.

The correlation of climatic variations, H. Arctowski (*L'Enchaînement des Variations Climatiques. Brussels, 1909, pp. 135, figs. 62; rev. in Science, n. ser., 31 (1910), No. 784, pp. 25, 26*).—This is a memoir based on a review of mean annual temperatures, 1891 to 1900, for the northern hemisphere. The variations are illustrated by means of charts for each year showing the geographical distribution of annual departures from normal temperatures (10 years). On these maps areas of positive departures are called thermopleions or simply pleions and negative areas antipleions. The pleions and antipleions are bounded by what is designated the quasinormal line, while lines of equal positive and negative departures are termed hypertherms and hypotherms.

In a review of this memoir in *Science* the author states:

"The pleions represent inflections of the isothermal lines toward the pole, or, more properly speaking, toward the regions of colder climate.

"The antipleions, on the contrary, characterize a local abnormal descent of the isotherms toward the equator.

"The maps of successive years, for the same country, and those of different countries for the same year, show remarkable correlations in the distribution of the departures.

"A pleion, in most cases, exists during several years, moving from place to place. When one compares the different maps, and especially those of European and Asiatic Russia, one is led to believe that the pleions are produced by immense waves intercrossing. It seems that for the whole world the years are either too warm or too cold following the predominance of pleions or antipleions. For example, the year 1893 was exceptionally cold, 1900 on the contrary was too warm. The temperature of the earth's atmosphere was at least one-half a degree Centigrade higher during the year 1900 than during 1893. It is a notable fact that neither the Alps, the Caucasus, nor the Rocky Mountains form barriers, not even the Himalayas interrupt the progress of a pleion or an antipleion. This demonstrates the fact that the thermopleions and antipleions are products of temporary alterations of the general circulation of our atmosphere."

The utilization of these correlations as a basis for weather prediction and for developing methods for further investigation is briefly discussed.

Extreme winters and summers (*Rev. Sci. [Paris], 47 (1909), II, No. 16, pp. 500, 501*).—An attempt is made to show a certain periodicity in the occurrence of extreme winter and summer temperatures and to trace a relationship between such seasons and certain solar activities.

On Lockyer's 35-year period in the solar activity, C. Easton (*K. Akad. Wetensch. Amsterdam, Proc. Sect. Sci., 11 (1908–9), pt. 2, pp. 842–847, pl. 1*).—Evidence is adduced to show "that Lockyer's opinion, according to which a 35-year period should be traceable in the materials now at hand, is untenable."

The appearance and return of cold waves, E. LESS (*Landw. Jahrb., 38 (1909), Ergänzungsb. 5, pp. 405–422, figs. 4*).—Various types are charted and discussed.

Variations in climate, E. BRÜCKNER (*Mitt. Deut. Landw. Gesell., 24 (1909), No. 37, pp. 556–561*).—Variations in temperature and rainfall for the northern hemisphere, but especially for Germany, for long periods of years are given and discussed, and a certain periodicity in rainfall and correlation between crop yields and climatic variations in the German Empire are shown.

Local temperature forecasting by differences in temperature between Mount Royal and McGill College Observatory, C. H. MCLEOD and H. T. BARNES (*Proc. and Trans. Roy. Soc. Canada, 3. ser., 2 (1908), Sect. III, pp. 157–162, figs. 2*).—This is a continuation of studies (E. S. R., 20, p. 513) which have shown that the difference in temperature between the high level and low level stations furnishes a satisfactory means of predicting temperature conditions at the low-level station a day in advance. This is based upon the fact, which seems to be well established, "that the comparatively low regions of the upper atmosphere show advance changes over those at the earth's surface, whereas above the inversion layer there appears to be a lag." Examples of the successful application of the method are given.

The prediction of periods of good weather (*Bul. Internat. Bur. Cent. Met. France, 50 (1909), No. 223, pp. 4; abs. in Rev. Sci. [Paris], 47 (1909), II, No. 20, p. 627*).—The inauguration of the practice of making such predictions by the French and English meteorological services is referred to.

Observations on air currents by means of pilot balloons, R. BÖRNSTEIN (*Landw. Jahrb., 38 (1909), Ergänzungsb. 5, pp. 395–404, figs. 6*).—A series of observations is reported and charted.

Deficient humidity of the atmosphere—II, Comparisons of various forms of hygrometers, T. A. STARKEY and H. T. BARNES (*Proc. and Trans. Roy. Soc. Canada, 3. ser., 2 (1908), Sect. III, pp. 187–193*).—In continuation of previous investigations (E. S. R., 19, p. 414) a study was made of the precise conditions under which the wet and dry bulb instrument gives accurate readings or deductions. It is shown that "the instrument can be manipulated so as to give fairly approximate results, but hitherto no conditions have been attached to its use; the well known tables of Glaisher have always been taken as correct and sufficient without further data, but [it is shown that] results may be obtained differing widely in their nature by simply altering the conditions of the instrument, and of the currents of air around it, etc."

Atmospheric electricity, E. THOMSON (*Science, n. ser., 30 (1909), No. 781, pp. 857–869*).—An important feature of this paper is a discussion of the nature and origin of electrical storms or disturbances in the atmosphere, including a consideration of lightning flashes or strokes and their control.

Annual report of the director of the [Philippine] Weather Bureau for the year 1907 (*Ann. Rpt. [Philippine] Weather Bur., 1907, pt. 1, pp. 153*).—A record of hourly meteorological observations at the Manila Central Observatory during the year.

Meteorological observations (*Ann. Statis. City Tokio, 6 (1909), pp. 1–15*).—Observations on temperature, pressure, precipitation, humidity, and wind made at Tokyo since 1882 are summarized in tabular form.

Meteorology [of British Guiana], A. W. BARTLETT (*Handbook Brit. Guiana, 1909, pp. 91–100*).—A summary is given of observations for varying periods of years on pressure, temperature, rainfall, humidity, sunshine, and wind, at the Botanic Gardens, Georgetown, and other places in British Guiana.

It is stated that the climate of this region compares very favorably with that of most tropical countries. The mean annual temperature, 1899 to 1908, was

about 80° F. and varies very slightly throughout the year. The mean annual rainfall, 1880 to 1908, was 92.84 in. The year is roughly divided into 2 wet and 2 dry seasons, a long wet season beginning about the middle of April and lasting until the beginning of August and a short wet season covering a part of November, December, and January. The nights are cool enough to be pleasant but are not subject to a great fall of temperature.

Roumanian agricultural climatography, W. PRAGER (*Rumänien's Landwirtschaftliche Klimatographie. Halle, 1909, pp. XV+203, pls. 7, chart 1*).—This book, which is intended to aid in the improvement of Roumanian agriculture by diffusing a better knowledge of the relation of climate to crops, describes in detail the physiographic and climatic features of 3 typical districts, namely, the mountains, the foothills, and the plains, and discusses the selection and culture of crops with reference to the climatic conditions.

Attention is given especially to the climatic conditions of the plains, which constitute the great crop-producing area of the country, and which are subject to disastrous droughts. In opposition to Hepites' contention that the climate of Roumania has not undergone any change the author maintains that the rainfall has diminished as a result of the removal of forests. As a remedy for the unfavorable conditions he recommends reforesting and irrigation with the use of methods of culture specially designed to conserve the soil moisture.

Evaporation in Egypt and the Sudan, B. F. E. KEELING (*Survey Dept., Egypt, Paper No. 15, pp. 29, pl. 1*).—"The present report is an attempt to summarize the present knowledge of the rate of evaporation from water surfaces in Egypt. The first section describes the results of a series of comparisons which have been made at Helwan Observatory between several types of evaporimeter which have been used in Egypt from time to time. Afterwards, a summary is given of the rates of evaporation which have been observed at the second-order meteorological stations in the Nile Valley. In the third section an attempt is made to evaluate the rate of evaporation from the Aswan Reservoir and other natural water surfaces in Egypt, and the results are given of some measurements which have been made of the rate of evaporation from the Nile in the neighborhood of Cairo. In the last section some remarks are made on the relation of the evaporation to the other meteorological factors, and the diurnal variation of the evaporation is described. The evaporation from the cultivated land is not treated, as up to the present few or no reliable experiments have been made."

The rains of the Nile Basin and the Nile flood of 1907, H. G. LYONS (*Survey Dept., Egypt, Paper No. 9, pp. 60, pls. 8, fig. 1*).—The detailed data which are given show that the flood of 1907 was deficient as compared with that of 1906, and an attempt is made to explain the variation in flood volume with a view to early prediction of the probable abundance or deficiency of the water supply for summer crops. The importance of more complete information as to the monsoon and winter rains of Abyssinia in relation to such prediction is pointed out.

Rainfall in Italy (*Ann. Uffic. Cent. Met. e Geod. Ital., 25, pt. 1; abs. in Nature* [*London*], *80* (*1909*), *No. 2059, p. 192*).—Rainfall data for 26 years, 1880 to 1905, obtained at 215 of the 700 rainfall stations of the Italian meteorological service are summarized in this report.

The shortest period dealt with in any case is 15 years. The largest annual rainfall reported was 90 in. at Gemona, near the Austrian frontier, the smallest 18.6 in. at Foggia. Wide seasonal variations in different parts of Italy are recorded, the maximum rainfall occurring in midsummer in the extreme north and in midwinter in Sicily. On the northern plains and in the northern half of the country in general two maxima, in May and October or November, occur.

In the southern half of the peninsula the principal maximum occurs in October and secondary maxima in January and April.

The fertilizing value of rain and snow, F. T. SHUTT (*Canada Expt. Farms Rpts. 1909, pp. 190–192*).—This is a continuation of investigations referred to in the last report of the station (E. S. R., 21, p. 308) and includes data regarding the amount and nitrogen content of precipitation during the year ended February 28, 1909.

It is shown that the rain and snow at Ottawa during this period amounted to 32.63 in. of water containing 8.364 lbs. per acre of nitrogen as compared with 37.35 in. of precipitation containing 4.323 lbs. of nitrogen per acre the previous year. Of the total amount of nitrogen 84 per cent was in the form of free and albuminoid ammonia, and 16 per cent as nitrates and nitrites. It is estimated that 90 per cent of the nitrogen was furnished by the rain.

The rain falling in September, October, and November was particularly rich in ammonia. This is attributed to the fact that a very severe drought prevailed during August, September, and the first 3 weeks of October, and to the bush fires which prevailed during this period. Another cause of irregularity in the nitrogen content of rain and snow was the high winds that prevailed from time to time immediately before or during the early part of a rain, when the surface soil was dry.

"As such usually occur after a period of longer or shorter drought, when the surface of the cultivated fields is dry and loose, the air is filled with particles of organic matter, manure, and débris of various kinds. Naturally the rain falling through such an atmosphere has its nitrogen content very greatly increased. Unfortunately there seems to be no plan or method whereby this source of error can be eliminated or avoided, and it is quite possible that a part of the larger amount of nitrogen, recorded for the past year, is due to the greater frequency of such winds during periods of dryness last summer."

The average composition of the snow was very nearly the same as that of the preceding winter.

Water systems, L. W. CHASE (*Ann. Rpt. Nebr. Bd. Agr., 1909, pp. 353–362*).—The sources of water supply used in Nebraska are described and the advantage and methods of securing better water systems in rural homes are discussed.

Well waters from farm homesteads, F. T. SHUTT (*Canada Expt. Farms Rpts. 1909, pp. 193–197*).—The results of examinations of 96 samples of water from different parts of Canada are reported. Of these, 26 were adjudged as pure and wholesome, 32 as suspicious and probably dangerous, 26 as seriously polluted, and 12 as saline.

In presenting these results the author, as in previous years, lays special emphasis upon "the importance of pure water and the danger that lurks in the barnyard well." It is stated as a result of 20 years' investigation that it is quite exceptional to find a water from a shallow well free from pollution.

The Charlottenburg sewage field and its industrial importance, GEISSLER (*Gsndts. Ingen., 32 (1909), No. 44, pp. 738–742*).—This farm is described and its cost of operation and efficiency as compared with other sewage farms in Germany are discussed.

Of the total area of about 2,181 acres included in this farm, 659 acres are under irrigation. The average daily amount of sewage used on this area during periods when no rain falls is 30,000 cubic meters. This is increased to 60,000 cubic meters at times of heavy rainfall. In 1907, 11,170,00 cubic meters of sewage was disposed of. The raw sewage as applied contains on an average per liter 750 mg. of suspended matter, 1,330 mg. of dissolved matter, 60.5 mg. of nitrogen of which 50.2 mg. is organic nitrogen and 10.3 mg. ammoniacal nitrogen, and 270 mg. of chlorin. The potassium permanganate con-

sumption is 220 mg. per liter. The sewage is used for the irrigation of grass, beets, potatoes, and garden vegetables. The running expense of the farm in 1907 was 4 cents per head of population served.

SOILS—FERTILIZERS.

Soils, P. Vageler (*Bodenkunde. Leipsic, 1909, pp. 114*).—This is a brief simple presentation of the more important facts relating to the agricultural classification, origin and formation, physics, chemistry, and biology of soils.

General soil and plant culture, M. Hoffmann (*Jahresber. Landw., 23* (*1908*), *pp. 1–96, figs. 2*).—This is a review, similar to those of previous years, of investigations during 1908 on weather and water; chemistry, physics, and biology of soils; fertilizers; and fertilizing. The review is made up of plain concise statements of the essential facts of practical value developed in the different investigations, but the statements and references are sufficiently explicit to be of value to investigators.

Report of the work of the Vienna Agricultural Experiment Station for the year 1908, W. Bersch (*Ztschr. Moorkultur u. Torfverwert., 7* (*1909*), *No. 2, pp. 55–72; abs. in Chem. Abs., 3* (*1909*), *No. 23, p. 2848*).—Summaries of the results of investigations by Wilk on the absorptive capacity of peat litter (E. S. R., 21, p. 225), and by Miklauz on the effect of alkalis and mineral acids on the humus compounds of peat (E. S. R., 21, p. 220) form a part of this review of the work of the year.

The present status of soil bacteriology, H. Fischer (*Jahresber. Ver. Angew. Bot., 6* (*1908*), *pp. 31–46, XV, XVI; abs. in Centbl. Bakt.* [etc.], *2. Abt., 25* (*1909*), *No. 10–13, pp. 315, 316*).—A review with a bibliography.

The organisms of the soil, E. H. L. Schwarz (*Sci. Prog. Twentieth Cent., 4* (*1909*), *No. 13, pp. 150–160*).—This is a summary of the more important facts brought out by investigations in recent years on algæ, molds, fungi, bacteria, and myxomycetes which take part in soil formation, decomposition of soil constituents in general, and especially the transformation of nitrogen compounds of the soil and the symbiotic and nonsymbiotic fixation of nitrogen.

Bacterial population of samples of soils from the Far North (City of Obdorsk and Yamal Peninsula), S. Severin (*Vyestnīk Bakt. Aghron. Stantzīī V. K. Ferreīn, 1909, No. 15, pp. 116–128; Centbl. Bakt.* [etc.], *2. Abt., 25* (*1909*), *No. 19–25, pp. 470–479*).—Examinations of 6 soils from northern Siberia are reported, showing wide variations in the bacterial content.

The bacterial content appeared to depend directly upon the amount of organic matter in the soil. The largest numbers of organisms were found in a garden soil and in the soil of a high tundra. These soils were also rich in molds. The garden soil contained mainly micro-organisms which peptonized gelatin, but it also contained nitrifying and denitrifying organisms. In samples of soil from a street in Obdorsk bacteria were found which energetically oxidized nitrous to nitric acid but none which oxidized ammonia to nitric acid or which completely decomposed the nitrates. Denitrification to the extent of reducing nitric to nitrous acid was observed in all of the soils.

Weathering of rocks under the influence of humus substances, A. Nikiforov (*Zhur. Opuitn. Agron.* (*Russ. Jour. Expt. Landw.*), *9* (*1908*), *No. 3, pp. 362–386; abs. in Chem. Abs., 3* (*1909*), *No. 23, p. 2847; Zentbl. Agr. Chem., 38* (*1909*), *No. 11, p. 778*).—Examinations of rocks which had undergone weathering in moors showed that under the influence of free humus acids a yellowish-white coating had been formed on the rocks from which nearly all the bases had to a large extent been leached out. There was, however, in some cases a relative increase in potash over that found in the unweathered

rock, resulting from a more rapid disappearance of the other bases. This potash was found to be less soluble in hydrochloric acid than that in the unweathered rock. There was a much larger percentage of silicic acid in the weathered material than in the unweathered rock.

The results indicate that the lower the aluminum content of the rock-forming minerals the greater their solubility.

The author is of the opinion that the formation of kaolin takes place to only a slight extent in the presence of humus acids. In the weathering of podzol soils the same kind of changes go on in the silicates as in moor soils. He suggests that the formation of hardpan in such soils is due to the leaching down of the humus acids into the lower layers of the soil, where they are neutralized by the bases present.

Similar changes in silicates, due to the action of humus acids, occur in black soils, but in such soils the action of the acids in forming difficultly soluble compounds is masked by the presence of easily soluble salts in the surface soil.

It was found that in calcareous soils the lower layers of the soil were enriched in bases at the expense of the upper layers.

Investigations on the decomposition of various green manuring plants in the soil, O. Lemmermann, A. Tazenko, and H. Fischer (*Landw. Jahrb.*, *38 (1909), Ergänzungsb. 5, pp. 101–116; abs. in Centbl. Bakt.* [*etc.*], *2. Abt., 25 (1909), No. 10–13, pp. 317, 318*).—Pot experiments with serradella, rape, beans, vetches, and lupines with and without the addition of straw, superphosphate, and calcium carbonate are reported.

The results showed that in most cases there was no loss of free nitrogen 3½ months after the green manures had been turned under, although nitrogen had evidently been lost in the form of ammonia. With lupines, rape, and beans much less nitrogen became soluble in water than with vetches and serradella. The greater the proportion of crude fiber in the green manuring plants the smaller the amount of nitrogen rendered soluble. The addition of straw, superphosphate, or calcium carbonate exerted no important influence on the loss of nitrogen. The addition of straw, however, reduced the amount of nitrogen rendered soluble.

In vegetation experiments the green manuring plants had very little effect. Under the conditions of the experiments the crude fiber exerted a beneficial influence on the action of the green manures. During an experimental period of 28 days there was very little difference in the decomposition of the carbohydrates of the various green manuring plants.

Nitrification from the biological side, I. A. Makrinov (*Vyestnīk Bakt. Aghron. Stantzīi V. K. Ferreīn, 1908, No. 14, pp. 132–179; abs. in Zhur. Opuitn. Agron.* (*Russ. Jour. Expt. Landw.*), *10* (*1909*), *No. 3, pp. 427, 428*).—From an extended review of the literature of this subject the author concludes that: (1) Organic matter in the form of humus, however abundant in the soil, does not injuriously affect nitrification, but is rather favorable to it. (2) At the same time this abundance of organic matter is not a necessary condition, because soils poor in humus can in the course of time produce intense nitrification. (3) Humic substances, apparently, act favorably on the multiplication of organisms; and in general, the more the soil is provided with active organisms and the more it is capable of carrying on a rapid nitrification the more humus it contains.

The author's own investigations also relate to the significance of organic matter in the process of nitrification. With the aid of gelatinous silica obtained by dialysis in parchment tubes, a nitrous micro-organism was separated from two soils (one alkaline). This micro-organism is 1.8 μ long and 1.3 μ wide, consequently is somewhat smaller than the St. Petersburg micro-organism of

Omelianski, which it greatly resembles in all other morphological properties. Cultures were made on the magnesia-gypsum disks of Omelianski and magnesia disks of Perotti. As a substratum Omelianski's solution of salts with the addition of varying quantities of extracts from dry leaves was used, and ammonia was added in the form of the slightly soluble ammonium-magnesium phosphate (NH_4 Mg PO_4).

The results of this preliminary work are summed up as follows: (1) Organic matter in the form of soil, or of extracts from dry leaves or soil, exerted a favorable influence on the growth of the nitrous organism on a solid substratum, but an unfavorable influence in a liquid. (2) An increase of the precentage content of carbonate of magnesia also exerted a favorable influence on the growth of the nitrous organism. (3) Pure magnesium carbonate appeared to be a very suitable substratum for the growth of the organism.

On the decomposition of nitrates by bacteria, II, S. Severin (*Vyestnīk Bakt. Aghron. Stantzīī V. K. Ferreīn, 1908, No. 14, pp. 14–42*).—The investigation reported was a continuation of earlier work by the author (E. S. R., 21, p. 22) and dealt with 2 organisms, *Bacillus pyocyaneus* and *Vibrio denitrificans*, the latter discovered by the author. The former report described a study of these organisms in an artificial nutritive medium of a meat-peptone bouillon, under aerobic conditions; the present report deals with studies of their life activity under anaerobic conditions, and also with their denitrifying power in the soil.

The author gives data on the denitrifying activity of the organisms in nitrate bouillon in an atmosphere of hydrogen and carbon dioxid. The denitrifying process was found to be more energetic in an atmosphere of hydrogen than under aerobic conditions. Carbon dioxid lowers considerably the activity of the organisms, especially of *V. denitrificans*, but even in the latter case this activity is still quite energetic. In the opinion of the author these organisms as well as all denitrifiers, which decompose nitrates to free nitrogen, are aerobic in their nature, but the denitrifying process excited by them is an anaerobic process to a greater or less extent. For this reason there must be in the soil, when well aerated by cultivation, an energetic multiplication of the denitrifiers, but a feeble exercise of their denitrifying function, and conversely, in a soil compacted and poorly aerated there must be a feeble multiplication of the denitrifiers, but increased denitrifying activity.

The author describes studies of the life activity of the 2 organisms in 17 samples of most diverse soils. It appears that the energy of multiplication of the organisms in the soil depends directly upon the proportion of nutritive substances in the soil. The more fertile the soil the greater the multiplication of the denitrifying organisms. *B. pyocyaneus* is the more energetic organism and develops comparatively well even in poor soils; on the other hand, *V. denitrificans* being less active multiplies only in good soils. The introduction of manure and straw into the soil apparently intensified the life activity of *B. pyocyaneus*, both as regards its multiplication and its denitrifying power, but did not seem to affect appreciably *V. denitrificans*.

On the decomposition of nitrates by bacteria, III, S. Severin (*Vyestnīk Bakt. Aghron. Stantzīī V. K. Ferreīn, 1909, No. 15, pp. 37–53; Centbl. Bakt. [etc.], 2. Abt., 25 (1909), No. 19–25, pp. 479–492*).—The author here reports a continuation of the above studies.

In unfertilized clay soil these organisms in pure cultures produced almost no denitrification, but when fertilizers were added denitrification not infrequently became very marked. In chernozem soils the organisms produced no denitrification whether fertilizers were added or not. When the soils were heavily manured both organisms developed abundantly in the soil, but only one, *B.*

pyocyaneus, produced a slight denitrification. When the chernozem soil was sterilized, however, and inoculated with the organism and with soil extract containing various other organisms, denitrification was quite marked, especially when fertilizers were added, and the soil nitrates were completely decomposed when straw was added to the extent of 4 per cent of the soil.

Experiment in inoculation of an old cultivated soil with nitrogen bacteria, N. N. BLANDOV (*Vyestnīk Bakt. Aghron. Stantziī V. K. Ferreīn, 1907, No. 13, pp. 14–16*).—On one plat clover soaked with the culture was sown and on another clover not so treated. Oats were used as a cover crop in both cases. The first year no marked difference in the yield of clover was observed, but the next year the yield from the treated seed exceeded by 50 per cent that from the untreated seed.

Tubercle bacteria and clover sickness, L. BUDINOV (*Vyestnīk Bakt. Aghron. Stantziī V. K. Ferreīn, 1907, No. 13, pp. 17–109, dgms. 10*).—On the basis of several years' observations on the subject the author describes in detail the characteristics of clover from clover-sick soil as compared with that grown on normal soil.

Apparently the most characteristic difference was found in the rate of development of the root tubercles, and the author concludes that clover sickness is due to a weakening of the virulence of *Bacillus radicicola* in consequence of which the organisms are unable sufficiently to infect the root system of the clover plant and form the necessary tubercles. As a result the plant is unable to fix atmospheric nitrogen with sufficient energy to develop normally.

The beneficial effect of applying phosphatic and potash fertilizers to clover-sick land is ascribed not only to the favorable action of the fertilizers on the plant host but also to their action in increasing the life activity of the nitrogen-fixing organisms.

Importance of physical studies of the soil, R. ROCHE (*Bul. Inst. Égyptien, 5. ser., 2 (1908), No. 1, pp. 47–54*).—A general discussion of this subject.

The proportion of mineral constituents in granitic soils, C. PERRET (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 30 (1909), Nos. 49, pp. 691–695; 50, pp. 728–732*).—This paper is based upon a 9 years' study of the granitic rocks and soils of the Forez Mountain region of Saint-Bonnet-le-Chateau, Loire.

As a result of this study the author maintains, contrary to the general conclusion reached by Risler that granitic soils are rich in potash and poor in phosphoric acid, that the granitic soils in question are rich in both total and assimilable phosphoric acid, and in many cases are benefited by the application of potash fertilizers.

The mineral composition of the rocks and the physical and chemical properties of the soils are discussed. Seventy per cent of the rocks of the region are granitic, consisting essentially of quartz, feldspar, and black mica. There are, however, variations of the type rocks with a corresponding variation in the character of the soil resulting therefrom.

Examinations of 5 samples of typical soils are reported, showing fine earth varying from 31 to 88.6 per cent, nitrogen in fine earth from 0.06 to 0.4 per cent, total phosphoric acid from 0.12 to 0.79 per cent, assimilable phosphoric acid from a trace to 0.36 per cent, total potash from 0.41 to 1.18 per cent, assimilable potash from 0.007 to 0.04 per cent, and lime from 0.003 to 0.95 per cent.

Analyses of typical samples of the rocks from which the soils were formed showed phosphoric acid varying from 0.19 per cent in gneiss to 0.56 per cent in basalt.

The results show beyond question that these granitic soils are well supplied with phosphoric acid as well as potash. Fertilizer experiments with various crops indicated that the phosphoric acid was to a large extent readily assimila-

ble, while in many cases the potash was in very unavailable form and the soils responded to potash fertilizing.

Soils, F. T. Shutt (*Canada Expt. Farms Rpts. 1909, pp. 151–159*).—This includes the results of further chemical studies of soils collected during an agricultural tour of the Upper Columbia and eastern Kootenai districts of British Columbia (E. S. R., 19, p. 920); the results of examinations of samples of alkali soils from British Columbia and Ontario; further results of experiments on the nitrogen enrichment of soils through the growth of legumes (E. S. R., 18, p. 120); and results of observations on the value of soil inoculation for alfalfa.

Analyses of 12 samples of British Columbia soils are reported and discussed. Five of the samples were from typical sagebrush country. The examination of these soils showed:

"(1) That they are for the most part light chocolate, or brownish, sandy loams of a loose, almost ash-like character. The sand grains are chiefly very fine and the proportion of clay is quite small. They are soils that are extremely easy to work, but careful management is necessary when irrigating to prevent the cutting of deep channels and the washing away of the surface soil. There is no strong color line of demarcation between the surface and the subsoil, the former merging almost imperceptibly into the latter. As might be expected, however, there is more humus, and consequently the soil is somewhat darker, nearer the surface.

"(2) While the results of analysis do not show that uniformity in composition that characterizes many tracts of northwestern prairie soil, the evidences from the chemical standpoint are strongly indicative of a common origin.

"Their nitrogen content is exceedingly good and much higher than might be conjectured from their physical appearance. They are characterized by a large percentage of lime, a further feature betokening fertility. The amounts of potash present are also very satisfactory.

"The proportion of the mineral plant food constituents in available form is worthy of special attention. Although the soils are not rich in total phosphoric acid, the amount present that is more or less immediately assimilable is in all cases, save one, far above the average. As already noted, the potash content of the soils is excellent and the data denote a very large proportion of this store to be immediately available. The figures for the available lime also are very good, indicating undoubtedly a high degree of productiveness."

More or less complete examinations of several samples of alkali soils are reported, with descriptions of the character of the alkali present.

Continuing observations on the experiments begun in 1905, it was found that under continuous cropping with clover there was a decided increase in nitrogen in a light sandy soil each year during 6 successive years.

The application of 300 lbs. per acre of soil from an alfalfa field to land on which alfalfa was being grown for the first time not only greatly increased the yield over that obtained from inoculated soil, but resulted in a marked increase in the protein content of the alfalfa obtained.

The soil conditions of the Mkatta steppe, P. Vageler (*Tropenpflanzer, 13 (1909), No. 11, pp. 505–511*).—The results of a reconnoissance of this steppe from the mouth of the Myombo to Tame, East Africa, are briefly summarized, showing the general character of the soil, the weather conditions, and crop possibilities (cotton, tobacco). Attention is called to the fact that the rainfall is small and irregular and that irrigation is necessary for most crops.

Studies of the physical properties of the soils of Upper Egypt, R. Roche (*Bul. Inst. Égyptien, 5. ser., 2 (1908), No. 1, pp. 55–67*).—The physical prop-

erties with reference to relative fertility of 2 soil types of Upper Egypt (one light, the other heavy) are described.

On a long-period variation in the height of the ground water in the dunes of Holland, E. DUBOIS (*K. Akad. Wetensch. Amsterdam, Proc. Sect. Sci., 11 (1908-9), pt. 2, pp. 674-681*).—Periodic variations depending upon rainfall are described.

Improvement of peat soils and the chemical and physical composition of such soils, HITIER (*Bul. Soc. Nat. Agr. France, 69 (1909), No. 8, pp. 770-773*).—A brief account is given of the improvement of peat soils by drainage, burning the loose surface material, fertilizing with 446.28 lbs. of slag and 267.77 lbs. of kainit per acre, and allowing the soil to be compacted by the trampling of cattle. By this treatment the soil conditions were so improved that valuable pasture grasses replaced the coarser sedges and swamp plants. The original soil contained 14 to 15 per cent of sand, 3 per cent of clay, 2 per cent of lime, 50 per cent of organic matter, 22 per cent of humus, and 2 per cent of nitrogen.

Ireland's bogs and moor lands: Their treatment for tillage, G. RYCE (*Farmers' Gaz., 68 (1909), No. 49, pp. 1059-1061, figs. 7*).—The extent and character of the Irish moor lands and their reclamation and utilization for agricultural purposes are discussed. It is shown that with proper drainage, preparation, and fertilizing these lands can be made highly productive for a variety of useful crops.

The manuring and improvement of moss land (*Scot. Farmer, 17 (1909), No. 884, p. 1042*).—An account is here given of an address by R. P. Wright based upon the results of experiments made under the auspices of the West of Scotland College of Agriculture. The result of 6 years' experiments showed that the productiveness had been decidedly increased for the 6 years from one application of basic slag and of slag and kainit.

Manuring of black fenland (*Cambridge Univ., Dept. Agr., Farmers' Bul. 6, pp. 4*).—Experiments with mangolds and potatoes on several types of fen soils to determine primarily how much superphosphate can be profitably used on such soils are reported. The superphosphate was compared with basic slag and was used alone and in combination with nitrogen and potash. The best results were obtained with a heavy application (6 cwt. per acre) of superphosphate, and indicate that soluble phosphate is the most valuable form to use on fenlands. The addition of nitrate of soda with a smaller application of superphosphate gave good results in the case of mangolds but was as a rule unprofitable in the case of potatoes.

Soil management, A. KEYSER (*Ann. Rpt. Nebr. Bd. Agr., 1909, pp. 167-176*).—The subject is discussed from the standpoint of management of the land (1) to produce the maximum crop for the time being, and (2) to maintain its productive capacity. The article deals especially with the conservation of soil moisture, prevention of soil washing, and rotation of crops, the purpose being to demonstrate that soil fertility may not only be maintained but also increased by the use of means possible on every farm.

Plant food: Its sources, conservation, preparation and application, W. H. BOWKER (*Boston, 1909, 2. ed., pp. 52*).—This book discusses the fertilizer requirements of plants, the essential elements of plant food, "bulk" in fertilizers, chemically mixed *v.* dry mixed and home mixed fertilizers, the "yeast of the soil" or soil bacteria, the comparative value of stable manure and commercial fertilizers, intensive farming, the application of fertilizers (including general directions for their use), specific directions for fertilizing different crops, and commercial valuations of fertilizers.

Is liberal fertilizing likely to prove injurious? CLAUSEN (*Illus. Landw. Ztg., 29 (1909), No. 85, pp. 799, 800*).—Experimental data are reported to show

that when the fertilizing constituents, particularly phosphoric acid, are used in excess of the actual needs of the crop or out of proportion to the other fertilizing constituents an injurious effect may result.

The use of fertilizers in Spanish agriculture, A. A. DE ILERA (*Prog. Agr. y Pecuario, 15 (1909), Nos. 645, pp. 574–576; 646, pp. 590–595, charts 3; 647, pp. 606–608*).—Statistics are presented of the consumption of the more important fertilizing materials in different provinces of Spain, 1907–8. Charts show the extent of use of potash, phosphoric acid, and nitrogen. Data are also given with reference to the cultivated area and the production of the principal crops.

Alpine fertilizer experiments in Carinthia, 1907–8, H. SVOBODA (*Ztschr. Landw. Versuchsw. Österr., 12 (1909), No. 10, pp. 697–712*).—The results of a large number of cooperative experiments on grass lands are summarized, and show very profitable returns from the use of both stable manure and commercial fertilizers on the thin soils of the Alpine meadows. The use of either manure or commercial fertilizers doubled the yield of green forage and hay, and a combination of manure and fertilizers increased the yield of green fodder 2½ fold and of hay 3 fold.

The season and chemical fertilizers, R. MARÈS (*Bul. Agr. Algérie et Tunisie, 15 (1909), No. 22, pp. 509–513*).—The effect of nitrogenous, phosphatic, and potash fertilizers on the growth of cereals on typical soils under the climatic conditions of Algeria is discussed.

Method of preparation of nitrate of soda, for agricultural use, by means of the nitrogen of the air and the sodium chlorid of sea water, R. BINAGHI (*Staz. Sper. Agr. Ital., 42 (1909), No. 7, pp. 415–436, figs. 2; abs. in Chem. Zentbl., 1909, II, No. 15, p. 1281*).—A patented process invented by the author is described.

The apparatus used is as follows: (1) A Hoffman voltameter with a stopcock at the base of the right branch; (2) an aspirator of 10 liters capacity; (3) eight Grenet cells; (4) a high potential induction coil; (5) a flask with 3 tubes, the 2 side tubes connecting with the aspirator and the nitrous vapor generator, and the middle tube, provided with a stopcock, being placed under the discharge of the right branch of the voltameter; and (6) a tube of strong glass provided with 8 platinum points soldered inside, and with stopcocks at the extremities of the tube. Sea water is put into the voltameter and on passing a continuous electric current through the water by connecting 2 of the Grenet cells to the voltameter, chlorin collects at the anode and hydrogen and sodium hydroxid at the cathode.

The sodium hydroxid is drawn from the right branch of the voltameter into the flask described under (5) above. Electric sparks are passed through the platinum points of the tube (6) by means of the induction coil and the other 6 Grenet cells, forming nitrous vapor which is made to pass into the flask containing the sodium hydroxid by opening the stopcocks of the tube and that of the aspirator. A constant current of air and successive formations of nitrous vapor being established, the sodium hydroxid is transformed into nitrate.

The mass that is formed in the flask is made up of sodium nitrate, traces of nitrites, alkaline hypochlorites (sodium, potassium, and magnesium), chlorids, and traces of calcium, but hypochlorites oxidize the greater part of the nitrite to nitrate. The liquid is decanted off and the residue dried at a low heat.

The salt was found to contain 86.8 per cent of sodium nitrate, equal to 14.3 per cent of nitrogen. A theoretical calculation gives 16,022 horsepower hours as the amount of power required to produce a metric ton of sodium nitrate by this process. At 4 mills per horsepower hour the cost of a metric ton would be $64.08.

The present status of the manufacture of nitric acid from the air, F. Russ (*Österr. Chem. Ztg., 12 (1909), No. 22, pp. 291, 292*).—The theory of the production of nitric acid by the oxidation of atmospheric air under the action of electrical discharges is briefly explained and the various processes which have been devised to utilize this principle are referred to.

The agricultural value of dried superphosphate, M. de Molinari and O. Ligot (*Ann. Gembloux, 19 (1909), No. 12, pp. 663–669, pls. 2*).—In pot experiments with oats grown on soil and sand, ordinary superphosphate containing 15.07 per cent of phosphoric acid soluble in alkaline ammonium citrate was compared with the same superphosphate dried at 165° C. and containing 17.34 per cent of phosphoric acid soluble in alkaline ammonium citrate when precipitated with ammonium nitromolybdate but only 4.22 per cent when precipitated with magnesia mixture by the direct method.

The results in general confirmed those of previous experiments by the authors and by Grègoire and Hendrick (E. S. R., 16, p. 32; 20, p. 726). They showed that the drying of superphosphate at 165° C. increased the rate of assimilation of the phosphoric acid and indicated the accuracy of ordinary chemical methods of determining the availability of phosphoric acid.

On the utilization of tricalcium phosphate by Cruciferæ, C. Ravenna and M. Zamorani (*Staz. Sper. Agr. Ital., 42 (1909), No. 7, pp. 389–396*).—Two series of pot experiments are described in which the plants used were mustard, vetch, and oats, and the cultures were made in pure quartz sand. In the first series the plants were watered weekly with a nutritive solution containing per liter of water, monocalcium phosphate 0.25 gm., calcium nitrate 1 gm., potassium chlorid 0.25 gm., magnesium sulphate 0.25 gm., potassium nitrate 0.25 gm., and ferric chlorid trace. In the second series pure tricalcium phosphate was mixed with the sand at the rate of 3 gm. per kilogram of sand, and the plants were watered with a solution corresponding to the one described above except that the monocalcium phosphate was omitted.

Tables are given comparing the two series and the different plants, with respect to the weight of the green plants, their weight in a dry state, the percentage of ash, the percentage of phosphoric acid in the ash, and the phosphoric acid absorbed during cultivation. Six per cent more phosphoric acid was absorbed by the mustard in the first series than in the second, but in the case of vetch the increase was 24.3 per cent and with oats 43.1 per cent.

Kainit and silicate of potash, Clausen (*Landw. Wchnbl. Schles. Holst., 59 (1909), Nos. 47, pp. 801–804; 48, pp. 821–823*).—Comparative tests of these two fertilizers by means of field and pot experiments with various crops, including potatoes, buckwheat, peas, and clover, gave variable results but indicated that in many cases kainit used in the ordinary way may prove positively injurious. It is pointed out, however, that these injurious effects may be overcome by proper use of the kainit in rotations of crops and that therefore the results of these experiments should not be taken as bearing out Wein's conclusions (E. S. R., 20, p. 822; 22, p. 24) as to the relative value of potash silicate and other potash fertilizers.

Field experiments to test the action of silicate of potash (phonolite) and humus silicic acid, L. Hiltner and F. Lang (*Prakt. Bl. Pflanzenbau u. Schutz, n. ser., 7 (1909), Nos. 10, pp. 126–132; 11, pp. 139–151, dgm. 1; abs. in Illus. Landw. Ztg., 29 (1909), No. 86, pp. 811–812*).—Field experiments with oats and potatoes indicate that humus silicic acid has a very slight direct fertilizing value, but that under certain conditions it may increase the action of fertilizing constituents already in the soil or added in the form of fertilizers. The phonolite was shown to have a certain fertilizing effect, but much less than that of ordinary potash salts.

Phonolite as a fertilizer, M. Popp (*Mitt. Deut. Landw. Gesell., 24 (1909), No. 49, pp. 724–728*).—The results of a series of plat experiments with oats, comparing phonolite with kainit and 40 per cent potash salt, are reported, and the conclusion is drawn that phonolite in the form of fine meal exerts a distinct fertilizing effect on oats, which, however, is only 75 per cent of that produced by easily soluble potash salts. The use of the phonolite as a fertilizer was less profitable than that of the potash salts. Apparently the oats utilized only the potash of the phonolite soluble in hydrochloric acid.

Fertilizing materials, F. T. Shutt (*Canada Expt. Farms Rpts. 1909, pp. 159–166*).—Analyses, with descriptive notes, are given of samples of fish scrap from dogfish reduction works, and of mucks, muds, marls, gypsum, wood ashes, manure ashes, black muck ashes, cow manure, boiler scales, and flue dust.

Analyses of the dogfish fertilizer prepared at the government reduction works at Shippegan, New Brunswick, showed 7.73 per cent of phosphoric acid and 8.78 per cent of nitrogen. This represents a considerable increase in phosphoric acid as compared with the product of previous years. There was also a notable improvement as shown by the smaller amount of oil present, about 16 per cent in 1908 as compared with 25 per cent the previous year.

Utilization as fertilizer of tomato-cannery refuse, P. Accomazzo (*Riv. Agr. [Parma], 15 (1909), No. 48, pp. 757, 758*).—Analysis of this refuse (dried to 7.5 per cent of water) showed nitrogen 3.85 per cent, phosphoric acid 1.31 per cent, and potash 0.6 per cent. The author calculates that the wet refuse is worth about 7 cts. per 100 lbs. as fertilizer but considers that wherever possible it can be more profitably used for feeding cattle.

The utilization of night soil (*Engrais, 24 (1909), No. 47, pp. 1306, 1307*).—The industrial advantages and disadvantages of incineration are discussed.

AGRICULTURAL BOTANY.

A history of botany, 1860–1900, J. R. Green (*Oxford, 1909, pp. 543*).—This is a continuation of Sachs' History of Botany, 1530–1860, the English edition of which appeared in 1890. The general lines of the previous work have been followed, although greater effort has been made to show the trend of thought in the different departments of botany, and the book may be considered an epitome of the botanical activity during the latter part of the nineteenth century. A commendable departure is an exhaustive bibliography of the works referred to in the text.

Annual report of the Association for Applied Botany (*Jahresber. Ver. Angew. Bot., 6 (1908), pp. XLII+294, pls. 2, figs. 7*).—This is a report of the meeting at Strasburg in August, 1908, and among the papers presented were the following: Botany in the Agricultural Experiment Stations, by F. Muth; The Desirability of an Organization to Render Expert Decisions in Official Matters, by L. Wittmack; The Present Status of Soil Bacteriology, by H. Fischer (see p. 317); The Theories Concerning Smoke Injury and Some Reasons for Their Nonagreement, by A. Wieler; Summary of the Literature Relating to Smoke Injury During 1907, by A. Wieler; Potato Breeding Experiments and Investigations, by Arnim-Schlagenthin (see p. 336); Investigations on the Influence of Seed Bed on the Amount and Uniformity of Germination, by F. Muth (see p. 326); Some Diseases of Tropical Culture Plants, by C. Brick (E. S. R., 21, p. 744); and Notes on the Leaf Roll Disease of Potatoes, by O. Appel (see p. 347).

Distribution and movements of desert plants, V. M. Spalding (*Carnegie Inst. Washington Pub. 113, pp. V+144, pls. 31*).—An ecological study has been made of the flora of the vicinity of the desert laboratory on Tumamoc Hill,

near Tucson, Ariz., and within the limits of the laboratory domain and that part of the valley immediately adjacent 12 plant associations have been recognized and defined. These naturally fall into 4 groups corresponding with the main topographical features of the area under observation.

The observations made in this area, supplemented by comparative studies in the Gila Valley and elsewhere, have led to the conclusion that soil properties and aspect are of paramount importance in determining the local distribution of desert plants. With regard to the former it has been learned that soil water exercises a controlling influence, but that for certain species aeration and the percentage of alkali salts are also important.

Peculiarities of structure and habits, correlated with water supply on the one hand and temperature relations on the other, are exhibited by a large percentage of plants of the laboratory domain, and these structures and habits are believed to have determined and to be still determining the existence of the species in places where they are now growing.

On the germination of old and mutilated seeds, L. MACCHIATI (*Bul. Soc. Bot. Ital., 1908, No. 7–9, pp. 141–151*).—Experiments are reported on the germination of seeds of maize, barley, millet, chick-peas, and beans, in which old seeds were contrasted with those of the crop of 1907.

At temperatures ranging from 9 to 17° C., with a daily temperature at 3 p. m. of 12 to 16°, 18 per cent of maize, 51 of barley, 70 of millet, 22 of beans, and 23 of chick-peas germinated in 3 weeks when the seed was fresh, while of the old seed only 7 per cent of maize, 5 of barley, and 12 of millet germinated. None of the old leguminous seed sprouted and of the nongerminating seed the legumes were the first to rot. Where the temperature was increased to 20 to 24° the fresh seed gave the following germinations: 86 per cent of millet, 96 of maize, 100 of barley and beans, and 97 of chick-peas, while the old seed did not show any considerable increase.

In studying the effect of mutilation on germination it was found that one or both cotyledons of the leguminous seeds and one-half to two-thirds of the endosperm of grains could be removed without preventing the germination of the seeds when placed in favorable conditions. In some instances mutilation seemed to hasten germination.

The influence of seed bed on the amount and uniformity of germination, F. MUTH (*Jahresber. Ver. Angew. Bot., 6 (1908), pp. 152–222, fig. 1*).—The author has studied the influence of the seed bed on the germination of a large number of seeds, testing filter paper, a yellow clay seed bed, and 2 forms of a white clay seed bed. The germination of the different kinds of seed in the different seed beds is given at length.

The author finds that filter paper is best for the germination of French rye grass, alfalfa, spurry, hemp, parsnip, rape, mustard, fennel, onions, and garden beets. The yellow earthenware seed bed seems to be adapted to English rye, fescue, barley, oats, wheat, white clover, alsike clover, tobacco, flax, white pine, common pine, fir and larch, while the white clay seed bed was preferred for the germination of timothy Italian rye grass, redtop, orchard grass, red clover, crimson clover, serradella, vetch, cress, field spurry, buckwheat, etc.

The relation between the intensity of respiration and the germinative ability of seeds, O. K. HAUSMANN and H. P. IWANISSOWA (*Izv. Imp. St. Peterb. Bot. Sada (Bul. Jardin Imp. Bot. St. Petersb.), 9 (1909), No. 5, pp. 97–106*).—The author has reported upon experiments made to test the method proposed by Qvam (E. S. R., 17, p. 860) for the determination of the germinative ability of seeds. He found that while there was undoubtedly a relation between the respiration and germination of seeds, the connection was not sufficiently close

to warrant the taking of the carbon dioxid given off as an index to the germinative capacity of the seeds.

The respiration of the vegetative organs of vascular plants, G. NICOLAS (*Ann. Sci. Nat. Bot., 9. ser., 10 (1909), No. 1-3, pp. 1-113*).—An investigation was made of the comparative respiration of the blades of leaves and their petioles and of stems, roots, and other parts of plants that may function as respiratory organs. After reviewing the various theories regarding respiration and describing the methods of his experiments, the author gives detailed accounts of his investigations on the normal and intramolecular respiration of different parts of a large number of species of plants.

The blades of the leaves were found to respire more per unit of weight than the petioles and the petioles more than the stems. The exchange of gases in respiration is largely effected through the epidermis, while the water vapor escapes through the stomata. This was shown by applying layers of vaseline to the lower surfaces of the leaves, thus closing the stomata, when it was found that this procedure reduced transpiration much more than it checked respiration.

The author also considered the possible relation of the number and nature of the chloroleucites to resipration, the zymase theory of respiration, the relation between respiration and acidity of tissues, etc.

An extensive bibliography completes the article.

Influence of physical factors on transpiration, A. W. SAMPSON and LOUISE M. ALLEN (*Minn. Bot. Studies, 4 (1909), pt. 1, pp. 33-59, dgms. 4*).—Experiments were carried on with a large number of plants to determine the individual variation of species; to measure individuals of the same species, some of which had developed in the shade and some in the sun; and to determine the effect of altitude and pressure on transpiration, the relation between the internal structure and transpirations and the effect of acids, alkalis, and soil types on transpiration.

The authors found that the variation in transpiration per unit of surface for a given time was very slight in plants of the same species, whether grown in their natural habitats or in the plant house.

Of polydemic forms, when measured in their natural habitats, those developed in the sun were found to lose from 2 to 4 times as much water as those developed in the shade. When the two forms are placed in a sunny or shady situation the inequality of their transpiration is about as manifest in the sun as in the shade.

Other things being equal, an increase in the altitude was found to stimulate an increase in transpiration, and this was not due to differences in light intensity or lessened air humidity but was due to decreased pressure. This conclusion was checked under controlled conditions, showing that the greatest transpiration takes place where there is the least pressure.

Generally speaking, acid solutions accelerate and alkaline solutions retard transpiration, but in a few cases extremely weak alkaline solutions were found to increase it. Transpiration is often found to give as marked response to weak solutions as to stronger ones. Plants were found to lose more water through transpiration per unit of surface when grown in soils of coarse texture than when grown in soils of fine texture. This is believed to be due probably to the fact that physiological water is more abundant in coarse soils than in the finer ones. The soil texture appeared to have nothing to do with the amount of green material produced in the experiments. There appeared to be a slight tendency for transpiration to be depressed in the better soils and a correlation was found to exist between transpiration and the green weight of the tops of plants.

Carbon dioxid assimilation and the nutrition of plants with formaldehyde, T. BOKORNY (*Arch. Physiol.* [*Pflüger*], *128* (*1909*), *No. 10-12, pp. 565-586*).—The author reports having found that algæ could utilize formaldehyde in making starch, and he has continued his experiments, growing cress, peas, and seedlings of other flowering plants in cultures under glass jars in the absence of carbon dioxid with similar results. The bearing of his experiments on the various hypotheses regarding photosynthesis is discussed.

Direct assimilation of ammonium salts by plants, H. B. HUTCHINSON and N. H. J. MILLER (*Jour. Agr. Sci., 3* (*1909*), *No. 2, pp. 179-194, pl. 1, figs. 2*).—From water culture experiments which are reported in detail the authors conclude that "agricultural plants of various kinds can produce normal growth when supplied with nitrogen in the form of ammonium salts under conditions which exclude the possibility of nitrification. Some plants grow equally well with ammonium salts or nitrate as source of nitrogen. Other plants, while assimilating ammoniacal nitrogen in the absence of nitrates, appear to prefer nitrates. It is less certain whether ammonium salts can ever produce better final results than nitrates although we have indications that this may be the case.

"Lehmann found that whilst buckwheat failed to grow well with ammonium salts, maize did far better with this form of nitrogen than with nitrates during the first period of growth. Later on the nitrate plants recovered, and the ammonia plants became unhealthy. Kellner showed that paddy rice also prefers ammonium salts to nitrates to commence with, and that nitrates are better than ammonium salts for the later growth. The best results of all were obtained when both forms of nitrogen were employed together.

"Plants which take up nitrogen exclusively in the form of ammonium salts generally contain very distinctly higher percentages of nitrogen than when supplied with nitrates. The question arises whether the high percentages of nitrogen in leguminous plants may be due to the nitrogen—or most of it—being assimilated in a form more suited to the rapid production of proteids than nitrate."

A bibliography of 39 references to literature of the subject is given.

The chlorin content of leaves, A. J. J. VANDEVELDE (*Handel. Vlaamsch Natuur en Geneesk. Cong., 12* (*1908*), *No. 2, pp. 225-229*).—A study was made in 1907 and 1908 of the chlorin content of the leaves of a large number of plants, and according to their maximum content the author has grouped them into 6 classes as follows: (1) Those in which the chlorin content increases from May to September, attaining a maximum at that time, (2) those having a maximum in September with a minimum in July, (3) a maximum in July with a minimum in May and September, (4) a maximum in May with a minimum in September, (5) a maximum in May with a minimum in July followed by an increase in September, and (6) those in which there is no regular periodicity in regard to their chlorin content.

The acid excretion of roots, J. H. ABERSON (*Meded. Rijks Hoogere Land, Tuin en Boschbouwsch., 1* (*1908*), *pp. 1-18, pls. 4*; *Jahrb. Wiss. Bot.* [*Pringsheim*], *47* (*1909*), *No. 1, pp. 1-56*).—A study was made of the excretions from the roots of a variety of plants, and the author found that they were not acid in the usual sense of the word. Where an acid reaction to litmus was observed it was found to be due to phosphoric acid. The concentration of hydrogen ions was found too weak to make the excretions of much value as agents for bringing other elements into solution. The hydrogen ions in the carbonic acid given off from the root hairs were found sufficient to bring into solution various elements of the soil, particularly the phosphates. The same was found to be the case with humic acid, the concentration of the excretion being sufficient

to secure a maximum yield through the solution of plant food in culture experiments.

Some conditions for the formation of chlorophyll, B. L. ISSATCHENKO (*Izv. Imp. St. Peterb. Bot. Sada (Bul. Jardin Imp. Bot. St. Petersb.)*, *9 (1909)*, *No. 5, pp. 107–120*).—The author has given a résumé of his investigations relating to the conditions under which chlorophyll is formed.

He has found that a temperature as low as —8° C. does not check the formation of chlorophyll and that pigment is rapidly formed at the low temperature, illumination being the necessary condition for its formation. Chlorophyll, he claims, is formed under anaerobic conditions, and atropin, morphin, and other poisonous substances do not retard its production. It is also formed in the presence of vapors of formaldehyde or of chloroform, and this is believed to indicate that specific ferments have no part in its production. Hydrogen peroxid in a solution of 10 to 20 per cent checked the production of chlorophyll in etiolated leaves for 2 or 3 hours. After this time it was formed if the leaves were placed in the light, but if kept in darkness protochlorophyll was produced.

Phosphorus in relation to chlorophyll, V. BRDLÍK (*Sitzber. K. Akad. Wiss.* [*Vienna*], *Math. Naturw. Kl.*, *117 (1908)*, *No. 5–6, pp. 529–546*).—The author states that not only does the physiological action indicate a close relation between phosphorus and chlorophyll in the plant cell, but alcoholic and benzol extracts of green leaves show an inorganic phosphorus compound as well as colorless phosphatids, indicating that phosphorus plays a very important rôle in chlorophyll formation. The phosphorus in the plant was found to occur not only in combination with glycerin but also in other forms, and it is believed to play as important a rôle in the physiological activity of the plant as magnesium or potassium.

The relation between the intensity of light and the duration of illumination to the response in oat seedlings, A. J. BLAAUW (*K. Akad. Wetensch. Amsterdam, Proc. Sect. Sci.*, *11 (1908–9)*, *pt. 1, pp. 230–234*).—Experiments are reported with etiolated seedlings of oats in which the phototropic response to the intensity of light and the length of illumination was measured. Welsbach burners, kept constant by means of a gas-pressure regulator, were used for the weaker intensities, while for the greater light intensities electric arc lamps together with condensers were employed. The periods of illumination varied from 0.001 second to 13 hours, after which the plants were placed in darkness, and examined for phototropic curvature after about 2 hours.

The results show that a definite quantity of light is required to produce reaction, the intensity being inversely proportional to the length of exposure. For the production of phototropic curvature a definite quantity of radiant energy is necessary, and whether this is supplied in a very short time or with extreme slowness is a matter of indifference on the part of the plants.

The biological significance of nectar in the flower, W. BURCK (*K. Akad. Wetensch. Amsterdam, Proc. Sect. Sci.*, *11 (1908–9)*, *pt. 2, pp. 445–459*).—A study was made of the function of nectar in plants.

The author holds that there is a connection between the secretion of water and nectar in plants and that by the nectar secretion the sex organs in the flowers are protected. He has found that the nectar serves to keep the flower moist during the flowering period, thus aiding in the pollination. A number of so-called nectarless plants were investigated, and it was found that these secrete wax or mucilage, the biological significance of which is similar to that attributed to nectar.

The influence of air moisture on the duration of vitality of pollen, M. PFUNDT (*Jahrb. Wiss. Bot.* [*Pringsheim*], *47 (1909)*, *No. 1, pp. 1–40, dgm. 1*).—

The effect of moisture in the air, as well as some other factors, on the vitality of pollen has been investigated.

The author found a wide range of moisture required to preserve the viability of pollen for any length of time, pollen grains of a species of Abutilon keeping best where the atmosphere contained 60 to 90 per cent of moisture, while for many other species of plants 30 per cent or less of moisture in the air proved best. In no case were the pollen tubes found to withstand drying. The minimum temperature for the germination of freshly collected pollen from winter or early spring blooming flowers was found to be 4 to 5° C.

In a supplementary chapter the author gives data regarding the range and optimum concentrations of sugar solutions for the germination of pollen grains.

Some factors controlling fruit formation in Hymenomycetes, ELSIE M. WAKEFIELD (*Naturw. Ztschr. Forst. u. Landw., 7 (1909), No. 11, pp. 521–551, pl. 1, figs. 3*).—Studies were conducted with *Schizophyllum commune* and *Stereum purpureum* to determine the conditions under which sterile and fertile plant bodies and fruiting organs are produced.

As a result of artificial cultures and observations on fungi grown under natural conditions, the author claims that the tendency to form fruiting bodies is an individual characteristic with these species and is perhaps the same for all fungi. Through artificial cultures a race of continual spore-bearing generations lost to a marked degree the ability of producing plant bodies. It was found possible to induce the formation of fruiting bodies by reducing or entirely removing the nutrition of the mycelium.

The external conditions of light and transpiration were found to play an important part in the fruiting of fungi. Light seemed to have a direct effect, and transpiration, as influenced by the moisture of the air, was found to determine to a large degree the development of the fungi, the vegetative growth being greatly increased where the transpiration was lowered by reason of a saturated atmosphere, while the production of fruiting organs was favored by an increased transpiration of dry air.

Tulip thieves, B. A. PLEMPER VAN BALEN (*Meded. Rijks Hoogere Land, Tuin en Boschbouwsch., 1 (1908), pp. 147–158*).—An explanation is offered for the nonflowering of tulips when single leaves are put up from the bulbs instead of a flower-bearing stalk. Various reasons have been given for this behavior, such as atavism, degeneration, and bud variation. The author thinks, however, that it is due to pressure within the bulbs, resulting from their growth in very rich soils. The overfeeding of the bulbs, he claims, results in the production of a single large leaf that rapidly develops at the expense of other portions of the bulb and finally exerts so much pressure that the flower stalk is prevented from developing. Such bulbs tend to perpetuate this character, especially if well nourished, and when flowers are formed they are of very poor character.

FIELD CROPS.

Field experiments with farm crops, W. SAUNDERS, J. H. GRISDALE, W. T. MACOUN, F. T. SHUTT, C. E. SAUNDERS, R. ROBERTSON, J. MURRAY, A. MACKAY, W. H. FAIRFIELD, G. H. HUTTON, and T. A. SHARPE (*Canada Expt. Farms Rpts. 1909, pp. 6–32, 89–102, 119–122, 140–151, 176–178, 200–204, 208–223, 249–267, 274, 275, 276–289, 303–320, 332–336, 341–357, 368–391, 400–409, pls. 8*).—Results with field crops in 1908 are reported in a manner similar to that of previous years (E. S. R., 21 p. 321). At the various farms tests were conducted with numerous varieties of each of the following crops: Corn, oats, two and six rowed barleys, spring, winter, and durum wheat, emmer, spelt, buckwheat, flax, spring and winter rye, millet, horse beans, peas, field peas, alfalfa, red clover, alsike, timothy, mangels, turnips, carrots, sugar beets, and potatoes.

In tests at the various farms to determine the best width between rows of ensilage corn, that planted in rows 21 in. apart quite generally yielded a higher total weight than that planted in rows 28, 35, or 42 in. apart. In a test of methods of planting corn conducted at the Indian Head and Lethbridge farms, the corn planted in rows produced a greater yield than that planted in hills, the average difference at the Lethbridge farm being 1 ton 980 lbs. per acre. An early planting of root crops followed by another about 2 weeks later almost invariably showed a decisively greater yield in case of the earlier planting.

Tabulated data show the results of vitality tests of barley, wheat, and oats from each of the provinces.

At Ottawa, in special experiments with fertilizers continued for 21 years, no change from last year's plan was made, and the relative standing from each treatment for the whole period of test remained the same. With every crop, the average yield for whole test of each of these plats fertilized with some form of barnyard manure, exceeds that of the remainder of the 21 plats enriched with mineral fertilizers. In 1908 the yield on the rotted-manure plats of ensilage corn averaged 14 tons 676 lbs., or 1 ton 1,030 lbs. more than on plats fertilized with fresh manure. On the wheat plats, the difference was but 20 lbs. per acre in favor of the well-rotted manure, with turnips, 180 lbs., and with mangels, 1,387 lbs. Among rotations involving various crops and cultural methods adapted to sheep, hog, and other types of farming, in a 4 years' test a corn-grain-clover-hay rotation gave the highest net profit ($10.30 per acre). Potatoes spread out in a light room for a period of 1½ months before planting, produced yields averaging 18 bu. per acre higher than those produced by seed kept in a cellar at a temperature of 50 to 60° F., and 31 bu. per acre above those produced by seed kept in cold storage at 40°.

Chemical analyses showed (1) that a high water content of the soil decreased the protein content of the wheat, (2) that prolonged vegetative growth increased the starch content, and (3) that early ripening, lessening of soil moisture, and high temperature at time of maturity, produced hard, glutenous wheat. During storage flour and wheat increased in ash, protein, gliadin, and gluten content in every instance. Wheat that had remained "tough" for 8 months, showed no abnormality in any point save for a change in color. Neither fermentation nor heating occurred.

No perceptible difference in the content of sugar beets due to climatic differences of the stations, or to varied water supply, could be detected.

Turkey Red wheat produced the strongest flour but the lowest yield per acre. Egyptian Amber produced very good flour and yielded 51½ bu. per acre. Oats sown at the rate of 2½ bu. per acre produced 3 bu. 18 lbs. per acre more than those sown at the rate of 2 bu. per acre.

At the Nappan farm, applications of 250 and 500 lbs. of commercial fertilizer to turnips produced increased yields, but at an economic loss. The yields varied from 18 tons 610 lbs. to 23 tons 556 lbs. per acre. The use of clover as green manure on clay loam secured an increase per acre of 2 bu. 20 lbs. of wheat, 7 bu. 34 lbs. of barley, and 9 bu. 2 lbs. of oats. No advantage appeared from inoculating clover and alfalfa with nitroculture. A slight dressing of air-slaked lime on marsh or dike lands showed a decided advantage. "Run-out" heavy clay, very deficient in humus, on which was sown a mixture of 3 bu. of oats, barley, and peas, 12 lbs. of timothy, and 10 lbs. of clover per acre, showed an increase in yield per acre of 17 bu. due to the application of manure at the rate of 10 one-horse cartloads per acre, of 10½ bu. from the application of 300 lbs. of fertilizer, and 8½ bu. from the application of 150 lbs. of fertilizer. Preceding this crop the field had been sown at the rate of 3 bu. per acre with a

mixture of peas, oats, and vetches, and the crop plowed under for two successive years. The "take" of clover and timothy was good and the field appeared to be in good condition for crop growing. Marsh or dike soil was treated with muriate of potash, sulphate of potash, basic slag, bone meal, and complete fertilizer in varying amounts and combinations, harrowed in before planting. On a parallel series on which the fertilizer was applied after planting and without harrowing, the yields were distinctly greater, the maximum difference being nearly 22 bu. of oats per acre. The maximum yield, however, was produced from an application of 300 lbs. of fertilizer harrowed in before seeding. Experiments on marsh lands with lime, basic slag, bone meal, and a commercial fertilizer were continued from those of 1907 with the most perceptible residual advantage from basic slag and bone meal as indicated by the hay crop grown on these plats during this year. On the plats for special experiments with fertilizers, the residual benefit, during this, the fifth season without additional fertilization, was, in the series without clover, most marked on the plats previously treated with manure, complete fertilizer, and marsh mud. The plats with clover almost invariably gave decisively greater yields than those without, the maximum increase being 10 bu. 10 lbs. of oats on plats treated with marsh mud.

At the Brandon farm, seed oats dipped or sprinkled with either formalin or bluestone, or dipped with anti-fungi, in every case produced crops entirely free from smutty heads. In a rotation experiment testing the feasibility of substituting the turning under of leguminous crops for bare summer fallow, the 1908 yields were as follows:

Relative value of legumes plowed under every third year and bare summer fallow, at the Brandon and Indian Head farms.

Rotation.			Yield per acre.		Rotation.			Yield per acre.	
1906.	1907.	1908.	Brandon.	Indian Head.	1906.	1907.	1908.	Brandon.	Indian Head.
			Bushels.	*Bushels.*				*Bushels.*	*Bushels.*
Wheat	Red clover	Wheat	33.08	29.83	Vetch	Wheat	Oats	57.36	52.00
Alfalfa	Wheat and alsike.	Barley	41.70	....	Oats	Fallow	Wheat	35.75	31.66
					Wheat	do	do	35.58	36.07
Barley	Fallow	Wheat	36.41	31.17	Do	Oats	do	23.92	14.58
Do	Oats	do	24.25	14.10	Oats	Peas	do	....	31.26
Wheat	Peas	do	33.41	....	Wheat	Vetch	do	....	32.00
Oats	Vetch	do	32.92	....	Oats	Alsike	do	....	30.60
Barley	Alfalfa and alsike.	do	34.50	....	Barley	Alfalfa	do	....	31.66
					Alsike	Wheat	Oats	....	46.06
Peas	Wheat	do	27.17	....	Fallow	do	Barley	....	22.33
Red clover	do	do	24.25	....	Alfalfa	do	do	....	27.60

Oats as a nurse crop at Brandon produced a heavier crop of grain and left a better stand of grasses and clovers, which stood the winter better and produced a heavier crop of hay the following year than resulted when clovers and grasses were started with spring rye or barley.

At Indian Head, injury during 2 successive years resulted from artificial infection of the soil with smut, whether the seed was treated with bluestone or formalin or left untreated. Bluestone appeared to excel formalin, and the tests indicated that "wheat treated 1 year in advance of sowing is not ruined for seed."

At Lacombe, summer-fallowed land gave yields of wheat more than 3 times as great as those produced by brome grass sod plowed under and 2.8 times as great as timothy sod plowed under. Wheat following sod matured in about 4 days less time than that following summer fallow. Successive sowings of

winter wheat made on August 7, 14, 21 and 28, and September 4, gave yields decreasing as sowing was deferred. The first sowing of Dawson Golden Chaff yielded 30 bu. per acre, and the last sowing 8½ bu. Turkey Red wheat sown at the rate of 2½ bu. per acre matured earlier and gave a greater yield than that seeded at any lower rate. Spring wheat on timothy sod averaged 36 bu. 15 lbs. per acre, as compared with an average yield of 28 bu. 48 lbs. for the same varieties on corn and root land, and matured in 6 days less time. Oats seeded at the rate of 3 bu. per acre produced an average yield of 65 bu. 10 lbs., at the rate of 3½ bu., 66 bu. 6 lbs., and at the rate of 4 bu., 57 bu. 12 lbs. In case of oats sown on April 15, 21 and 28, and May 5, the larger yields were obtained from the sowings of the two later dates. On both packed and unpacked soil, oats seeded at the rate of 2½ bu. per acre excelled in yield those seeded at the rate of 2 bu. per acre. The packed soil yielded at an average rate of 85 bu. 8 lbs. per acre, as compared with a yield of 68 bu. 30 lbs. on unpacked soil. The soil tested "is a heavy vegetable mold in most places inclining to clay" with limited sandy areas, and of a generally loose texture due to a large percentage of humus. An application of manure at the rate of 20 tons per acre decreased the yield by 12 bu. 12 lbs. on one plat and increased it approximately 8 bu. on another, as compared with their respective check plats. A similar conflict of results followed the application of 10 tons. With direct applications of 20 tons and of 10 tons of manure per acre to Mensury barley the period required for maturing decreased about 3 days, and the yield decreased 16 bu. 12 lbs. in each case. Successive sowings of 2 and 6 row barleys at intervals of 1 week beginning April 17, produced maximum results in each case from the sowings made on the earliest date. Alfalfa grown on land inoculated by sowing soil at the rate of 100 lbs. per acre produced nearly 3 times as great a yield as was obtained from uninoculated land. The advisability of inoculating red clover is also indicated.

At Lethbridge, on the nonirrigated farm, an average increased yield of 2 bu. 8 lbs. of wheat per acre was apparently obtained from back-setting as compared with the yields obtained from breaking without back-setting. Successive sowings of wheat at intervals of about 2 weeks, from August 15 to December 1, showed a yield of 54 bu. per acre from the sowing made September 1, an increase of more than 7 bu. per acre over that sown August 15, and of 15 bu. per acre over that sown September 16. Seeding at rates of 15, 30, 45 lbs., etc., per acre up to 120 lbs., gave maximum results from 75 lbs. per acre in case of winter wheat, and from 105 and 90 lbs., respectively, in case of spring wheat and oats, while on the irrigated farm seedings of 60 and 75 lbs. of spring wheat, 75 lbs. of oats, and 60 lbs. of barley, gave the best results. Good results were obtained from the inoculation of alfalfa by sowing soil, from sowing 5 to 30 lbs. per acre of seed, and with various clovers and grasses.

Reports on experiments with some new nitrogenous manures on oats, hay, potatoes, mangel and sugar beet, R. A. Berry (*West of Scot. Agr. Col. Ann. Rpt.*, *9* (*1909*), *pp. 15–31*).—This series of experiments is a comparison of the value of lime nitrogen, lime nitrate, and basic lime nitrate, with nitrate of soda and sulphate of ammonia as sources of nitrogen.

Eight plats planted to oats showed no advantage in applying lime nitrogen alone, and less advantage in applying it in combination with other mineral fertilizers than was derived from the same amount of nitrogen in nitrate of soda in the same mixture. Other plats with the same crop showed very little difference between the results of an application of 100 lbs. of nitrate of soda and the same amount of nitrogen in lime nitrate, but the same amounts of nitrogen in basic lime nitrate and lime nitrogen gave lower results approximately equal to each other.

Three plats of hay, fertilized with 100 lbs. of nitrate of soda and the same amounts of nitrogen in sulphate of ammonia and lime nitrogen, gave results in the first two cases of approximately 2 tons 480 lbs. of hay per acre, and 1 ton 1,994 lbs. for the lime nitrogen. Other plats of hay showed an increased yield of 1,180 lbs. per acre in case of plats fertilized with 125 lbs. nitrate of soda per acre as compared with the check plats. The application of an equivalent amount of nitrogen as basic nitrate of lime and of nitrate of lime gave increased yield of 605 lbs. and 400 lbs. per acre, respectively.

Plats of mangels showed a difference of but 870 lbs. per acre in favor of an application of 2 cwt. of nitrate of soda per acre, as compared with the same amount of nitrogen supplied in lime nitrate when each was applied with 10 tons of manure and 400 lbs. of superphosphate per acre. This difference increased to 2½ tons per acre when each was applied in one and one-half times as great quantity with superphosphate and kainit.

On other plats there was an increased yield of 2 tons 1,305 lbs. of mangels over that of the check plat in case of lime nitrogen, of 5 tons and 720 lbs. in case of nitrate of soda, and of 4 tons 1,130 lbs. in case of sulphate of ammonia. Each of the fertilizers was applied in drills in the spring in amounts to supply per acre the amount of nitrogen contained in 250 lbs. of sulphate of ammonia, except that one-half of the nitrate of soda was reserved for later application as a top-dressing.

In the potato plats there was a difference in yield of 1,600 lbs. per acre in favor of an application at the rate of 100 lbs. per acre of sulphate of ammonia over the same amount of nitrogen supplied in lime nitrate when each was applied with manure, superphosphate, and sulphate of potash. The difference increased to 2 tons and 50 lbs. when twice the amount of nitrogen was applied in each form in mixture with larger amounts of superphosphate and sulphate of potash. Lime nitrogen gave a slightly higher percentage of merchantable potatoes.

Another series of plats gave yields of potatoes differing but 1,750 lbs. per acre when fertilized with 150 lbs. of sulphate of ammonia and an equivalent amount of nitrogen in lime nitrate, each mixed with sulphate of potash and basic slag.

The Vilmorin and Klein Wanzleben varieties of sugar beets produced nearly 3 tons more of roots per acre than did the Aderstedt variety. Roots grown in drills 20 in. apart were slightly smaller than those grown in drills 27 in. apart, but excelled them in yield, percentage of dry matter, and percentage of sugar in juice, the sugar yields per acre being 2.25 tons and 1.75 tons, respectively. The effect of manuring on the sugar content was variable and within the limits of experimental error.

Report of the Aligarh Agricultural Station of the United Provinces of Agra and Oudh, for the year ending June 30, 1909, A. E. PARR (*Rpt. Aligarh Agr. Sta. United Prov. Agra and Oudh, 1909, pp. 5, map 1*).—The experiments reported were mainly with cotton. The American variety, Watagodu, produced 21.4 per cent more when sown early with irrigation than when sown early with rains. Mixed country cotton showed a difference in favor of planting with rains instead of irrigation of 32.7 per cent. Although at the station American cotton produced lower yields than did the ordinary country cotton, the crops grown by private individuals in the district showed opposite results.

Hybrid American cotton produced 21.4 per cent greater yield on ground plowed early and plowed three times than on ground plowed but once and that immediately before sowing. Another American cotton produced a yield 21.8 per cent greater when sown after the plow in rows 3 ft. apart than when broadcasted.

Other experiments were with indigo, English and Canadian oats, fruit trees, and Australian saltbushes.

Report of the Partabgarh Agricultural Station of the United Provinces of Agra and Oudh, for the year ending June 30, 1909, S. M. HADI (*Rpt. Partabgarh Agr. Sta. United Prov. Agra and Oudh, 1909, pp. 10*).—Of 5 varieties of transplanted rice tested, Shamghata produced the highest yield (at the rate of 2,459.26 lbs. per acre). Of the local varieties tested, Banki produced at the rate of 745.71 lbs. per acre.

In a variety test looking to the introduction of maize, a maximum yield at the rate of 3,564 lbs. per acre was produced by the Jaunpur variety. In an experimental planting of jute, the variety Capsularis yielded at the rate of 714 lbs., and Olitorius at the rate of 697 lbs., of fiber per acre. These yields are regarded as favoring this crop. San hemp yielded at the rate of 540 lbs. of fiber, and 812 lbs. of seed, per acre. Of 16 varieties of sugar cane tested, Reora of Benares produced the maximum yield.

Other crops experimented with were white soft wheat, Cape oats, white linseed, pale gram, white Kabuli gram, dark gram, barley, peas, and brown linseed. Noteworthy yields were, per acre, wheat 2,580 lbs., pale gram (in the jhil) 3,064 lbs., white Kabuli gram 1,154 lbs., oats (in the jhil) 3,857 lbs., and peas after rice 2,742 lbs.

Fifth annual report of the Minnesota Field Crop Breeders' Association (*Ann. Rpt. Minn. Field Crop Breeders Assoc., 5 (1908), pp. 84, figs. 12*).—This report contains the constitution of the association, minutes of the fifth annual business meeting, and addresses of a general and educational nature on oat production, corn, onion, and potato culture, and information with regard to agriculture at the state fair.

Comparative yields of cereals on different kinds of fallow cultivation, A. BICHIKHIN (*Zap. Imp. Obshch. Selsk. Khoz. Yuzh. Ross., 77 (1907), No. 11–12, pp. 47–99*).—This article gives a survey of the results obtained without fertilizers at Poltava, Kherson, Ploti, Odessa, and Don experiment fields, in a test of bare fallow, nonfallow, and early, middle, and late green fallow. In each series of experiments with fallow, winter rye and winter wheat were used. Soil analyses and meteorological data for each field are tabulated.

As shown by the results at the 5 fields, early green fallow produced yields 10 per cent greater than those produced by middle green fallows, 53.7 per cent greater than those produced by late green fallow, and had a still greater advantage over the yields produced on nonfallow land. The influence of fallow culture on the second crop following it proved insignificant. The limited experience thus far seems to indicate that when a summer cereal follows the winter crop the stubble should receive an early shallow breaking, followed by fall plowing or a regular plowing in July, and that the introduction of corn, potatoes, beets, and other intertilled crops into the rotations would be advantageous.

Identification of American brewing barleys based upon the Swedish system, A. NILSON (*Jour. Soc. Brew. Tech., 1 (1909), No. 5, pp. 263–280, figs. 25*).—A discussion of certain botanical characteristics as a means of identifying barleys.

The cotton plant: Its cultivation in various parts of the world, C. D. GIROLA (*El Algodonero su Cultivo en las Varias Partes del Mundo. Buenos Aires, 1910, pp. XXI+1092, figs. 226, maps 10*).—This is a treatise dealing exhaustively with the production of cotton, cotton oil, and certain other cottonseed products.

Data regarding the history, geographical distribution, and botanical characters of the plant are followed by a discussion of its physiology, histology, and

chemical composition. Its climate and soil requirements are stated, together with the fertilizers best adapted to its growth. Choice of varieties, seed selection, and cotton breeding are discussed in full. Other topics treated are preparation of the soil, diseases, harvesting, ginning, baling, marketing, the principal cotton markets of the world, and the extraction of oil from the seeds. The food value of the various cotton-seed products are stated in full.

An extensive bibliography is appended.

The production and commerce of the feather grass of Algeria (*Bul. Off. Gouvt. Gén. Algérie, 1909, No. 21, Sup., pp. 127–136*).—This grass is principally used in the manufacture of paper of various grades and for various purposes. Its natural geographical distribution is given, together with a list of the principal countries to which it is exported.

Report on variety tests of oats, R. P. WRIGHT and A. N. M'ALPINE (*West of Scot. Agr. Col. Ann. Rpt., 9 (1909), pp. 37–77, 127–161, 167–193, 199–220*).—Experiments were conducted with uniform station-grown seed on twentieth-acre plats on 147 different farms, during the 5-year period ended with the season of 1906. The average yields of the 3 typical varieties tested were Banner, 66 bu. of dressed grain per acre, Potato, 57 bu., and Sandy, 53 bu.

In a test of 27 varieties conducted on 33 different farms, 429 iron frames were used, these frames being bottomless and each enclosing a part of the field in which 32 seed oats were sown at uniform distances and under uniform conditions. "The produce of this miniature acre is intended to show the links of connection between the variety of the oat and the acre yield of the crop." The characters studied were the mortality of the varieties, their tillering power, proportion of mature straws to barren shoots, straw length, straw bore, ear length, and number of spikelets per ear.

Studies based on about 200 samples of oats representing 20 varieties and grown on 17 different farms, indicated that marks of good seed are (1) proper weight per thousand seeds, and (2) assurance that the seeds have come from prolific ears or heads. A study of maximum and minimum weights per thousand kernels of various varieties showed that among those designated as small oats, the average weight per thousand kernels ranged from 21.8 gm. to 23.6 gm. Among the large oats the range was from 25.4 gm. to 31.5 gm. Even for the same variety of oat, however, higher bushel weight was found to be no guide to higher kernel weight, and manurial applications had little effect on the kernel weight. Data are also presented on the proportion of kernel to husk and its relation to milling power.

Potato breeding questions and observations, ARNIM-SCHLAGENTHIN (*Jahresber. Ver. Angew. Bot., 6 (1908), pp. 118–130*).—The author discusses the behavior of the potato on crossing and observes that bud variations involving morphological and accompanying variations result. Variable and fluctuating characters and those which appear as a result of local influences may become constant. A variety having red tubers produced, from cuttings, variants with white tubers. Among other tendencies which seemed to be transmitted was that to a fixed form of leaf and to correlation between the colors of the blossom and the tuber, the stem and the leaf, and the habit of growth of the plant and its inner characters. Seedlings of the same cross showed a varying susceptibility to disease.

Potatoes: Cultivation, manuring, varieties, storing, and seed supply in Bengal, F. SMITH (*Dept. Agr. Bengal, Quart. Jour., 3 (1909), No. 1, pp. 1–12*).—This article outlines experiments conducted since 1890, including fertility, variety, planting and rotation tests, and experiments with storage methods and on the use of potatoes of various sizes as seed.

The influence of water content upon the value of beet seed, D. HEGYI (*Österr. Ungar. Ztschr. Zuckerindus. u. Landw., 37 (1908), No. 6; Zentbl. Agr.*

Chem., 38 (1909), No. 7, pp. 465–467).—Experiments were conducted with 5 samples of beet seed, each divided into 3 parts, one of which was dried in air for 5 days, another at 50° C., and the third kept in a damp room for the same period, at the close of which the air-dried seeds averaged 13.08 per cent water, those dried at 50° C., 4.86 per cent, and those kept damp, 20.9 per cent.

Tests made of the vitality and viability showed that the drying exerted a favorable influence upon both, as indicated by the strong and rapid development of the embryos. The recommendation is made that where beet seed offered for sale has a water content of more than 15 per cent, a reduction be made for each additional per cent.

[Report on experiments carried out on sugar plantations during the year ended December 31, 1907], J. B. HARRISON (*Georgetown, Demerara: Govt., 1908, pp. 7*).—Data are presented for the crops of the year, with tables giving information relating to the various varieties tested on 31 different plantations. These tests were conducted to determine the quantity of product and its quality as related to its manufacture and the fuel value of the megass.

The sugar laws, É. LÉGIER (*Les Lois Sucrières. Paris: Govt., 1909, pp. 1857*).—This volume presents a collection of French laws, decrees, proclamations, and certain other legal documents relating to sugar, covering the period 1304–1909. A brief history of the origin of sugar laws is also given.

The importance of rotations in tobacco culture, O. CHEVALIER (*Canada Dept. Agr., Tobacco Div. Bul. A5, pp. 12*).—This bulletin contains notes on the plant food and soil requirements of tobacco, the fertilizer and moisture requirements of the soil, and the rotations and cultivation best suited for tobacco production. The rotation recommended is (1) tobacco, (2) a cereal, and (3) clover.

Report on the tobacco industry in Ontario, W. A. BARNET (*Canada Dept. Agr., Tobacco Div. Bul. A4, pp. 14*).—This bulletin contains a general report and recommendations on methods of preparation of land, manuring and fertilizing, cultural methods, seed selection, and the eradication of insect pests.

Experimental work carried on in 1908 (*Canada Dept. Agr., Tobacco Div. Bul. A6, pp. 31*).—This bulletin consists of three articles.

I. *Preliminary experiments in growing seed plants*, F. Charlan.—These experiments undertook to determine, (1) the limitations of the use of bags during fertilization, (2) the effects upon seed production of the entire or partial removal of the leaves, (3) the influence of season and temperature, and (4) the proper time of harvesting seed. Capsules fertilized under bags and ripened in the open air had an average germination percentage of 16.4 above that of capsules fertilized and ripened under bags, and of 1.61 per cent above that of capsules fertilized and ripened in the open air. It is concluded that all leaves should be left on seed plants save the bottom leaves that would ordinarily disappear at priming and the top leaves ordinarily removed at the time of topping. Harvesting should be completed early and the capsules picked just before the sepals turn brown.

II. *Experiments in the sterilization of soils*, F. Charlan.—Soils were sterilized experimentally during the years 1906–7 to control the blight or mosaic disease by means of formalin and by treatment for 30 minutes with steam under 60 lbs. pressure. The formalin was used in a solution containing 2½ lbs. of formalin to 50 gal. of water and applied at the rate of 1 gal. per square foot. Both methods appeared effective. The treatment by steam also killed weed seed and is preferred except in the absence of a boiler.

III. *Commercial fertilizers in tobacco culture*, O. Chevalier.—This article outlines plat fertilizer experiments by which the tobacco grower may test the fertility requirements of his soils.

Report on trials with varieties of wheat, J. G. Stewart (*Edinb. and East of Scot. Col. Agr. Bul. 18, pp. 9*).—In this variety test of wheats Browick stood first in yield of straw and salable grain, and White Chaff Squarehead, second.

Lime nitrogen as a means for the destruction of wild mustard, Heinrichsen (*Prakt. Bl. Pflanzenbau u. Schutz, n. ser., 7 (1909), No. 8, pp. 110–112, fig. 1*).—An experiment was carried on with lime nitrogen for the reduction of wild mustard, in which it was applied as a top-dressing at the rate of 150 and 300 lbs. per hectare. The application was made on May 8 and the harvest of the oat crop followed June 12, at which time there was a decided reduction in the amount of wild mustard. The author states that for 3 or 4 days after the application the oats were yellowish in appearance, but soon recovered. The mustard, however, became brown in a short time. Clover that had been sown with the crop was not injured.

Dry farming in Wyoming, V. T. Cooke (*Cheyenne, Wyo., [1909], pp. 14, figs. 2*).—This publication contains a statement of conditions in the arid regions of Wyoming and the cultural systems, harvesting, type of farming, and crops best adapted to these regions.

HORTICULTURE.

Horticultural work at the Canadian experiment stations, W. T. Macoun, R. Robertson, J. Murray, A. Mackay, G. H. Hutton, W. H. Fairfield, and T. A. Sharpe (*Canada Expt. Farms Rpts. 1909, pp. 103–119, 122–124, 127–136, 270–271, 293–301, 321–331, 357–365, 392, 393, 409–421*).—The usual report on the cultural experiments and variety tests of various fruits, vegetables, trees, shrubs, and flowers being grown on the different experimental farms in Canada, together with general notes on the work being conducted along horticultural lines (E. S. R., 21, p. 331).

At the Central Farm at Ottawa, W. T. Macoun in charge, a record has been kept since 1898 of the first day when the frost was out of the ground sufficiently, and the ground dry enough, to permit of working in the nursery. The earliest date was March 23, and the latest April 19, the average for the 11 years being April 11.

A large number of seedling fruits received for examination during the year are listed and described, together with the several new or little known apples in the provinces of Ontario and Quebec, and apples originated in the station orchards which fruited in 1908.

In connection with apple breeding work, seed was saved from Wealthy fruit grown at the station in 1898. Of the seedlings produced, 98 have fruited during the course of ten years, and a table is given showing the percentages of various characteristics found, as based on the descriptions of 93 of these seedlings. Although the Wealthy apple is said to have originated from "cherry crab seed," only 6 of the 93 seedlings were distinctly crablike. The fruit from 93.5 per cent was large enough to be marketable. None of the fruit was entirely green or yellow, all having more or less red, the Wealthy itself being yellow splashed or washed with crimson. Fifteen per cent bore fruit orange red in color. Sixteen per cent of the apples were sweet and 1 per cent was mildly subacid, 65 per cent being above medium in quality. As to season, 23 per cent of the seedlings were about as the Wealthy and over 18 per cent were later. A large proportion of the apples bore considerable resemblance to the Wealthy.

Records have been kept since 1898 of the yields from each apple tree in the station orchards, and these are presented in tabular form. They show a marked

difference in the yields of trees of the same variety, planted in the same year, and in about the same kind of soil.

Further data are given on the strains of tomato seed being saved at the station. The selection for earliness has resulted in plants which bear ripe fruit 19 days earlier than the plants from the selection which has been made for productiveness. Plants which were selected for earliness and uniformity without regard to productiveness yielded 20.42 per cent less than the plants selected for productiveness, while the amount of ripe fruit up to August 18 was 46.11 per cent greater in the selection for earliness alone than in the selection for productiveness. The selection for uniformity has not given as marked results as the selection for earliness. Where the selection for earliness has been made from the individual plant each year, the average date of the first ripe fruit is 5 days earlier than where the selection was made from the first ripe fruit in the field.

Height and diameter measurements are given for the trees growing in the forest belts at the farm, together with descriptive lists of the best hardy ornamental, evergreen, and deciduous trees, and of a number of single and double varieties of lilacs being tested.

R. Robertson, in charge of the substation at Nappan, N. S., reports data on the dates of picking and yields of different varieties of strawberries, garden peas and beans, and on the yields of tomatoes.

Similar data are given for a large number of vegetables grown at the Saskatchewan Substation, A. Mackay in charge, together with the blooming periods of a large number of annual and perennial flowers.

In addition to the usual varietal notes, J. Murray, of the Manitoba Substation, and G. Hutton, of the substation for Central Alberta, give notes on a large number of trees and shrubs planted in 1907, showing their condition the following spring, and T. A. Sharpe, of the British Columbia Substation describes several varieties of apples or pears which are very little known or fruited at the station for the first time in 1908.

The seeds of horse-radish and the results from sowing them, J. Brzeziński (*Bul. Internat. Acad. Sci. Cracovie, Cl. Sci. Math. et Nat., 1909, No. 7, pp. 392–408, pls. 4; abs. in Rev. Sci.* [*Paris*], *48* (*1910*), *I, No. 1, p. 21*).—Successful experiments in the production of perfect seed of the common horse-radish (*Cochlearia armoracia*) through the agency of annular decortication are reported, and the progeny secured from these seeds discussed.

Two strongly different types of plants were found among the seedlings which, if their source had not been known, would hardly have been classed as belonging to the same species. The ordinary horse-radish resembled some intermediate forms secured. The author is of the opinion that common horse-radish is merely a hybrid and that the contrasting forms secured are the result of the breaking up of this hybrid into its original types.

On the mineral nutrition of the mushroom (Agaricus campestris), A. Hébert and F. Heim (*Nancy* [*1909*], *pp. 12*).—On the basis of the analyses presented of various parts of the mushroom the authors are of the opinion that both lime and potash fertilizers could be used with profit in mushroom culture.

Pineapple growing in Bataan and Bulacan provinces, M. M. Cruz (*Philippine Agr. Rev.* [*English Ed.*], *2* (*1909*), *No. 9, pp. 502–507, pl. 1*).—A brief general account of pineapple growing in these provinces, including suggestions for improvements in methods of culture.

Grape culture: Planting, grafting and pruning, J. De Bano (*Estac. Agr. Cent.* [*Mexico*] *Bol. 11, pp. 25, figs. 36*).—A popular bulletin on grape culture dealing specifically with methods of propagation, planting, grafting, and pruning.

Recent observations on the hybrid direct bearers in the valley of the Rhone, A. DESMOULINS and V. VILLARD (*Prog. Agr. et Vit. (Ed. l'Est.-Centre), 30 (1909), Nos. 46, pp. 604–614; 47, pp. 643–645; 48, pp. 657–659; 49, pp. 687–691*).—Observations similar to those noted in previous years (E. S. R., 19, p. 141) are reported on a large number of hybrid direct bearing grapes.

Production of cacao in the French colonies, A. BERTEAU (*Agr. Prat. Pays Chauds, 9 (1909), No. 80, pp. 363–383*).—A statistical review of the cacao industry in the French colonies of America and Africa.

On some facts relative to hybridization in the Citrus genus and on the origin of the sweet orange (Citrus aurantium), L. TRABUT (*Compt. Rend. Acad. Sci. [Paris], 149 (1909), No. 24, pp. 1142–1144*).—The author calls attention to the Clementine orange which he announced in 1902, and which appeared to have arisen from the hybridization of *Citrus nobilis* and *C. bigaradia*. Seedlings of the Clementine have proved to be remarkably variable. Not only are the parent forms represented, but a large number of the seedlings have been sweet oranges practically identical with *C. aurantium*. The author concludes that the latter species is in reality only a hybrid produced by chance crossing in countries where *C. nobilis* and *C. bigaradia* are both grown.

The latest developments in fig culture, W. T. SWINGLE and G. P. RIXFORD (*Cal. Fruit Grower, 40 (1909), No. 1120, pp. 4, 5*).—A summarized account of the development of Smyrna fig culture in California. The conclusion is reached that although the production of the finest figs requires some attention to details, such as the care of the capri trees and caprification, the crop is never lost by late spring frosts, the trees require little pruning, no spraying, and no thinning of fruit, and will bring in at 5 or 6 years of age, when planted in suitable soil and climate, a gross income of about $100 per acre at present prices.

A new hawthorn-medlar graft hybrid, L. DANIEL (*Compt. Rend. Acad. Sci. [Paris], 149 (1909), No. 22, pp. 1008–1010*).—The author investigated a graft of medlar on hawthorn which was called to his attention by C. Brun in 1906, and found that the fruit and vegetative growth of the graft presented forms resembling both the hawthorn and the medlar, as well as intermediate forms. The various forms observed are described.

Notes on the native seedless persimmon, W. L. WOODBURN (*Proc. Ind. Acad. Sci., 1908, pp. 99–101*).—A report of a preliminary study of the embryology of some seedless persimmons which fruited in the vicinity of Indiana University during the year 1908.

Tillage v. sod-mulch, U. P. HEDRICK (*Ann. Rpt. Vt. State Hort. Soc., 6 (1908), pp. 54–66*).—A popular discussion of this subject, based largely upon the results secured during the first 5 years of the long-continued orchard tillage experiment being conducted at the New York State Station (E. S. R., 21, p. 238).

Varieties of fruit trees recommended for the region north of the central Mesa (*Estac. Agr. Expt. Ciudad Juárez, Chihuahua, Bol. 22, pp. 24*).—The varieties of fruits here described and recommended for planting consist largely of those which have been found to succeed in the southwestern United States.

The development of a picking table for the more important pip fruits, E. JUNGE (*Geisenh. Mitt. Obst u. Gartenbau, 24 (1909), No. 8, pp. 113–118*).—The author points out the value of collecting information in various localities relative to the time of maturing of apples and pears under various climatic and soil conditions, and presents data based upon 10 years' observations at Geisenheim showing the dates of maturity of a large number of varieties of apples and pears.

The preparation of fruit and vegetables for market, S. B. SHAW (*Bul. N. C. Dept. Agr., 30 (1909), No. 5, pp. 3–38, figs. 25*).—This is a general discussion relative to cultivation, picking, grading, packing, labels, and packages, together with detailed directions for harvesting and preparing various orchard and small fruits and vegetables for market.

Pre-cooling fruit, G. D. KELLOGG (*Cal. Fruit Grower, 40 (1909), No. 1120, p. 1*).—The method of pre-cooling fruit for shipment across the continent as worked out by the Bureau of Plant Industry of this Department (E. S. R., 20, p. 43), was put to an extensive commercial test during the past season. The author reports that out of 57 cars pre-cooled in this manner there was but one claim for loss and damage in transit, and in this case the fruit was not promptly shipped after pre-cooling. An equal number of cars of fruit shipped without being pre-cooled brought many claims for damages.

Methods of preserving fruit fresh, W. F. DOTY (*Daily Cons. and Trade Rpts. [U. S.], 1909, No. 3672, pp. 5, 6*).—Brief notes are given on the methods employed in Prussia in preserving grapes, apples, quinces, watermelons and muskmelons in the fresh state.

Conservation of fresh grapes in granulated cork, A. W. ROBERT (*Daily Cons. and Trade Rpts. [U. S.], 1909, No. 3672, p. 6*).—A brief note on this method of conserving grapes as employed in Algeria.

The exportation of fresh fruits from South Africa (*Bul. Off. Gouvt. Gén. Algérie, 1909, No. 23, Sup., pp. 151–168*).—This consists of notes extracted from official documents of the Cape, Transvaal, and Natal, reporting methods and experiences in recent years in the shipment of fresh fruits to Europe.

The present and future of horticulture and pomology in central and southern Italy, I. ZANNONI (*Bol. Quind. Soc. Agr. Ital., 14 (1909), No. 23, pp. 1076–1092*).—A general report on this subject and of the discussion following.

[Reports of the agricultural stations of the Gold Coast], W. S. D. TUDHOPE ET AL. (*Govt. Gold Coast, Rpt. Agr. Dept., 1908, pp. 20–29*).—Progress reports are given on the work of the Aburi Botanic and Agricultural Station, and the Tarkwa, Assuantsi, and Coomassie Agricultural Stations of the Gold Coast, relative to varieties of native and introduced fruits, vegetables, and general agricultural crops being tested, the more important indigenous products exported being palm oil, palm kernels, rubber, Kola nuts, copra, and gum copal.

Making horticulture pay, M. G. KAINS (*New York, 1909, pp. X+276, pl. 1, figs. 58*).—This popular work consists of a compilation of the experiences of a large number of actual farmers, several of them women, in growing vegetable, orchard, and small fruits. The subject-matter is presented under the following general headings: Garden soils and their care, fertilizers and fertilizing, water and its control, function of cultivation, fruit plantations and their care, orchard fruits, small fruits, the vegetable garden, spraying, and ornamentals.

The planters' handbook, G. BUNYARD (*Maidstone, Eng., 1908, pp. 160, figs. 50*).—This English work consists of a popular guide to the most useful park trees, evergreen and flowering shrubs, and ornamental trees, with cultural hints and illustrations.

Dutch bulbs and gardens, UNA SILBERRAD and SOPHIE LYALL (*London, 1909, pp. 176, pls. 24*).—This work portrays in a popular way the culture of bulbs in Holland, including descriptions of noted bulb gardens. The text is fully illustrated with colored reproductions of paintings by Mima Nixon.

Reproduction of flowering plants, F. RIOS (*Estac. Agr. Cent. [Mexico] Bol. 22, pp. 24*).—A popular bulletin discussing the usual methods of propagating ornamental trees, shrubs, and flowers.

The book of fern culture, A. Hemsley (*London and New York, 1908, pp. VIII+112, pls. 28*).—A practical handbook containing general directions for growing ferns for different purposes, including specific cultural directions for growing various classes of ferns.

FORESTRY.

Silviculture, C. Heyer (*Der Waldbau oder die Forstproduktenzucht. Leipsic and Berlin, 1906, vol. 1, 5. ed., pp. XII+518, figs. 331; 1909, vol. 2, 5. ed., pp. VI+302, figs. 57*).—The present revised and enlarged edition of this work, which is edited by R. Hess, is issued in 2 volumes. Volume 1 covers the preparatory phases of silviculture, such as selection of site, soils, and species, regeneration by natural and artificial means, seed bed, nursery and planting practices, and the necessary equipment for these operations. Volume 2 deals directly with the application of various silvicultural systems in developing and managing stands of various deciduous and coniferous species intended for timber alone and with those intended for both timber and minor forest products. Consideration is also given to the conversion from one silvicultural system to another.

Forest taxation, H. Weber (*Die Besteuerung des Waldes. Frankfort-on-the-Main, 1909, pp. X+555*).—The purpose of this work is to present the valid principles of forest taxation and to discuss their accuracy from the standpoint of legitimate tax distribution, with the view of presenting some light on the question of forest taxation, which is continually becoming of increasing importance. The first 2 sections of the work are devoted to a discussion of the general subject of taxation and revenues. Succeeding sections deal with direct taxes, the history of their development, the present status in Germany and neighboring countries, the taxation of forest revenues on the basis of general revenue taxes, and the taxation of forest yields, present and future.

Deforestation and its effects among the hills of southern Indiana, G. Culbertson (*Proc. Ind. Acad. Sci., 1908, pp. 27–37*).—In this paper the author endeavors to show the relation between deforestation in southern Indiana and the greatly increased run-off and decreased ground water supply of that region, together with the probable tendency of deforestation toward the reduction of the rainfall during the late summer months.

A tentative scheme for the utilization of waste lands, B. E. Fernow (*Farm and Dairy* [*Ontario*], *28* (*1909*), *No. 51, pp. 3, 4, figs. 3*).—Formulated plans adaptable to reforesting sand areas of Durham and Northumberland counties, Ontario, are presented and briefly discussed.

On the drying up of forest plantings in the steppes, N. Stepanov (*Lyesn. Zhur., 38* (*1908*), *No. 10, pp. 1323–1333; abs. in Zhur. Opuitn. Agron.* (*Russ. Jour. Expt. Landw.*), *10* (*1909*), *No. 3, p. 360*).—The author presents data to show that the dying out of forest plantings in the Russian steppes is not due to a lack of the chief fertilizing elements in the soil as contended by Kravkov (E. S. R., 20, p. 618). Analyses made of the soil in perishing plantations showed as high a content of phosphoric acid and potash as in the soil of thriving plantations.

Marking in practice, A. B. Recknagel (*Forestry Quart., 7* (*1909*), *No. 4, pp. 396–399, pl. 1*).—The methods of marking timber actually employed in the national forests are described.

Methods of determining the time of the year at which timber was cut, R. Zon (*Forestry Quart., 7* (*1909*), *No. 4, pp. 402–409, pl. 1*).—The author points out the greater economic value of wood cut in winter over that cut in summer, and reviews our present knowledge relative to methods of determining the time of year at which timber was cut. Particular attention is given to

the microscopical method of distinguishing summer and winter wood, worked out by Rashevsky (E. S. R., 10, p. 358), from which method it seems possible to determine from the appearance of the last wood layer whether the tree was cut in spring, summer, or during the dormant period of the year.

Forest products of Canada, A. H. D. Ross (*Dept. Int. Canada, Forestry Branch Bul. 4, pp. 33*).—This bulletin contains estimates and statistics corrected to December, 1908, relative to forest areas, reserves, and timber supplies, the production of timber and other forest products in the different provinces, and the exports and imports of forest products. The bulletin also discusses to what extent statistical information relative to forestry is available in Canada, and indicates means for obtaining more definite information on this subject.

[Forestry statistics of Ireland, 1908], W. G. S. Adams (*Dept. Agr. and Tech. Instr. Ireland, Agr. Statis. 1908, p. XX–XXII, 142–153*).—Detailed tables are given for 1908 showing by counties and provinces the areas under forest trees with their classification and ages, areas under coppice or scrub, osier beds and forest nursery plantations, the total area under woods and plantations, areas planted and cleared, descriptions of trees planted and felled during the year, including the uses to which the timber was applied, and the number of trees used in Ireland and exported, with their estimated weight in tons. The total area under woods and forest plantations of all kinds was 301,636 acres.

Report on reforestation in Italy from 1867 to 1908 (*Bol. Min. Agr., Indus. e Com. [Rome], 8 (1909), Ser. A, No. 6, pp. 97–111*).—Detailed statistics are given relative to the various reforestation projects in the different provinces of Italy being carried on either at the expense, or with the assistance, of the government. In some cases summarized data are given for the period 1867 to 1907. In addition to the number, area, and cost of projects, the number of plants and amounts of seed of various species distributed, together with statistics of forest fires, are also given.

Woods and forests department, 1908, A. F. Broun (*Rpts. Finance, Admin., and Condition Sudan, 1908, pp. 427–443*).—A routine report relative to the administration of, and operations in, the woods and forests in the Sudan for 1908, including a financial statement for the year, together with tabular data relative to yields of major and minor forest products, revenues, expenditures, etc.

Forestry in New Zealand, W. C. Kensington (*Wellington: Govt., 1909, pp. 118, pls. 27, maps 2*).—Part 1 of this report describes the condition of New Zealand forests relative to their extent and character, estimated quantity of milling timber, and varieties of trees found in each land district. Part 2 describes sawmill operations in that country, including accounts of processes for preserving and seasoning timber and a discussion of the utilization of wood for purposes other than the supply of sawn timber to the building trade. Part 3 deals with the question of deforestation and the need of forest preservation. Part 4 contains data relative to the estimated forest wealth of the world, with special reference to those countries from which New Zealand may draw her future supply. Part 5 discusses in detail the nursery and planting operations of the afforestation branch. The text is accompanied by a map showing the forest reserves of New Zealand.

Annual progress report on forest administration of the lower provinces of Bengal, 1907–8, A. L. McIntire (*Ann. Rpt. Forest Admin. Lower Prov. Bengal, 1907–8, pp. II+46+4*).—The usual annual report relative to the constitution, management, exploitation, and administration of the state forests in the lower provinces of Bengal, including a financial statement for the year. The more important data relative to forest areas and surveys, forest products, revenues, etc., are appended in tabular form.

Annual report on the forest administration in Ajmer-Merwara, 1907–8, C. H. PRITCHARD (*Ann. Rpt. Forest Admin. Ajmer-Merwara, 1907–8, pp. 2+44*).—A statement similar to the above relative to the administration of government forests in Ajmer-Merwara.

Forestry in China, W. T. GRACEY (*Daily Cons. and Trade Rpts.* [*U. S.*], *1910, No. 3676, pp. 12, 13*).—A brief report of the German government's afforestation work in the Kiachow leased territory, together with an outline of afforestation activities in other sections of China.

The histological difference between Pinus tæda and Pinus palustris, KATHERINE G. BITTING (*Proc. Ind. Acad. Sci., 1908, pp. 127–129, figs. 6*).—The author points out the differences found in the woods of these species when studied under the microscope.

The factors given as the most prominent and also the most readily obtained in distinguishing the woods of the two trees are that in *Pinus tæda* the junction of the spring and summer wood in the year zone is not distinct and the medullary rays are somewhat obscure and close together, whereas in *P. palustris* the spring and summer wood are distinct from each other, and the medullary rays conspicuous and farther apart with a ratio to those in *P. tæda* of 4 : 11.

Indo-Malayan woods, F. W. FOXWORTHY (*Philippine Jour. Sci., C. Bot., 4* (*1909*), *No. 4, pp. 409–592, pls. 9*).—This work, which was undertaken primarily with the view of correlating Philippine woods with related or identical forms in other regions, consists chiefly of descriptive notes of the Indo-Malayan woods relative to their structure, uses, and distribution. Photographic plates of microscopical sections showing the wood structure of some 108 of the species described accompany the text. Tables showing the comparative weight and hardness of eastern woods, together with lists of woods suitable for special purposes, and rare, ornamental, or precious woods, and a chart showing the commercially equivalent woods of the Philippines and other timber producing countries of the East, are given and discussed, including notes on the timbered areas and future supplies in these countries.

Andaman Padouk (Pterocarpus dalbergioides), B. B. OSMASTON (*Indian Forest Rec., 1* (*1908*), *No. 3, pp. 239–244*).—An account of this timber tree relative to its habit, distribution, timber, conditions of growth, distribution of the age classes, reproductive power, plantations, insect pests, and natural reproduction.

Teak forests of Siam, C. C. HANSEN (*Daily Cons. and Trade Rpts.* [*U. S.*], *1910, No. 3679, pp. 8, 9*).—A brief account of the teak forests of Siam relative to their management and extent of production.

Japanese charcoal kiln, N. B. ECKBO (*Forestry Quart., 7* (*1909*), *No. 4, pp. 400, 401, pl. 1*).—An illustrated description is given, together with the method of operating the kiln.

DISEASES OF PLANTS.

Fungus diseases of plants, B. M. DUGGAR (*Boston, New York, Chicago, London, 1909, pp. XII+508, pl. 1, figs. 240*).—This is one of the Country Life Education Series, edited by C. W. Burkett, former director of the Kansas Experiment Station, and covers the subject of diseases of plants that are known to be due to fungi. After giving chapters on cultural methods, technique of fixing, embedding, and staining, and physiological relations of fungi, the author describes in detail the important diseases of plants due to fungi, including the slime molds and bacteria. In the discussion of each disease, as far as practicable the pathological effects and other relations of host and parasite are described, a clear account is given of the life history of the fungus, and suggestions are offered of methods for the prevention or control of the disease.

The material is arranged according to the sequence of the various classes of fungi and when used in connection with the extensive host index the student can readily determine what fungus diseases are to be expected on different host plants. Bibliographies of important contributions to the knowledge of the different diseases are given.

The author has prepared a valuable reference book on the fungus diseases of plants in America. It is rather remarkable that in view of the great activity in mycology and plant pathology during the past 20 or 30 years there has not previously been a general text or reference book of American origin upon this subject.

Report of the section for plant protection, 1908, A. LEMCKE (In *Bericht über die Tätigkeit der Pflanzenschutzstelle und über das Auftreten von Krankheiten und tierischen Schädlingen an Kulturpflanzen in der Provinz Ostpreussen im Jahre 1908. Königsberg, 1909, pp. 1–36*).—Notes are given on the weather conditions during the growing season of 1908 and the influence of the weather on various crops, as shown by their condition and yields. The relation of crops to climate and weather is discussed and descriptive notes and suggestions for treatment are given of a number of plant diseases observed during the year. The distribution in East Prussia of the diseases of the more important crops is indicated.

Notes on some plant diseases, G. LÜSTNER and H. MORSTATT (*Ber. K. Lehranst. Wein, Obst u. Gartenbau Geisenheim, 1908, pp. 94–98*).—Notes are given on a leaf disease of currants, American gooseberry mildew, Fusarium disease of beans, and a leaf disease of beech trees.

The leaf disease of currants is caused by *Glœosporium ribis*, a fungus that almost defoliates the plants. An investigation made of the susceptibility of different varieties indicated that the Red Holland was practically free from disease when other well-known varieties of currants were either entirely defoliated or the foliage was injured to a considerable extent.

The Fusarium disease of beans is similar in many ways to the wilt described by Appel and Schikorra (E. S. R., 18, p. 645), but the cause of this disease is believed to differ somewhat from that previously noted. It is believed that from a study of the material the form occurring on beans is either a variety or a race of *F. roseum*.

The leaf disease of the beech is said to be due to *Glœosporium fagicolum*.

The disinfection of seeds, R. MARÈS (*Bul. Agr. Algérie et Tunisie, 15 (1909), No. 19, pp. 437–440*).—Compiled data are given relating to the treatment of seed for smut prevention, the treatments described being formaldehyde solution, hot water, corrosive sublimate, and sulphate of copper. Directions for the preparation of these fungicides and their use are set forth at length.

Smut preventives, J. MURRAY (*Canada Expt. Farms Rpts. 1909, pp. 275, 276*).—A brief account is given of the results of treating seed grain with formalin, copper sulphate, and other fungicides for the prevention of smut. The grain was not seriously infested, as shown from the small amount of smut on the check plats, but where treated with formaldehyde or copper sulphate solutions there was no smut whatever. The other treatments, such as hot water, sulphid of potassium, sulphate of iron, anti-fungi, etc., were either less effectual in reducing the disease or their methods of application are too tedious to permit of their general use.

Experiments in combating the loose smut of grain, W. DETKEN (*Illus. Landw. Ztg., 29 (1909), No. 83, pp. 783, 784*).—The results of experiments with modified hot-water treatments for the control of loose smut of cereals are given, particular attention being devoted to the combating of the loose smut of summer wheat.

The author tested both hot water and hot air as means of preventing loose smuts of barley and summer wheat, and found both methods quite efficient where the grain was given a preliminary soaking of 6 hours in cool water. A temperature of 54 to 56° C. for hot water, drying the seed for 20 minutes at 65° after preliminary soaking, destroyed all smut in the seed grain, and the plats on which treated grain was sown were without any trace of disease. In comparative experiments where there was no preliminary soaking of the seed both of the treatments were without any practical effect.

Clover canker, P. ULRICH (*Landw. Wchnbl. Schles. Holst., 59 (1909), No. 41, pp. 690–693, figs. 3*).—A description is given of clover canker, due to *Sclerotinia trifoliorum*. In addition to red clover the fungus is known to attack alsike, white and crimson clovers, esparcet, hop clover, etc. It flourishes best in moist soils, and its spread through the presence of spores on the seed is claimed.

A leaf spot of cucumbers, H. M. QUANJER (*Tijdschr. Plantenziekten, 14 (1908), p. 78; abs. in Meded. Rijks Hoogere Land, Tuin en Boschbouwsch., 1 (1908), pp. 159, 160*).—A brief account is given of the leaf disease of cucumbers due to *Corynespora mazeï*. The disease can be held in check by spraying with Bordeaux mixture or some other good fungicide.

Coniothecium arachideum, a new fungus on peanuts, R. LUCKS (*Centbl. Bakt. [etc.], 2. Abt., 23 (1909), No. 21–25, pp. 642–655, pls. 3*).—A description is given of *C. arachideum*, a new species of fungus found occuring on peanut cake and peanut meal. The author's investigation showed that it is of quite common occurrence, being present in samples of peanut products from Asia and Africa, and it is also believed to occur in the United States.

Notes on some potato diseases (*Jour. Bd. Agr. [London], 16 (1909), No. 8, pp. 642–646, pl. 1*).—During an investigation of the prevalence of the wart disease of potatoes (*Chrysophlyctis endobiotica*) in Great Britain, a number of other diseases were observed to be widely distributed, and brief notes are given on them preliminary to a full report of the investigation. The diseases described are corky scab (*Spongospora scabies*), root rot (*Rhizoctonia violacea*), leaf blotch (*Sporidesmium solani varians*), blackleg or stem rot (*Bacillus phytophthorus*), and a disease due to *Hypochnus solani*.

Potato diseases, R. SCHANDER (*Fühling's Landw. Ztg., 58 (1909), No. 8, pp. 273–285, figs. 4*).—Attention is called to the leaf roll and bacterial ring diseases of potatoes in an account given of experiments which show the effect of selection of tubers on the presence of the diseases. Varieties were found to differ very materially in their susceptibility, and the author believes that through the breeding of resistant varieties the losses due to these diseases may be largely overcome.

Resting spores of the potato fungus, L. R. JONES (*Science, n. ser., 30 (1909), No. 779, pp. 813, 814*).—In a previous publication (E. S. R., 20, p. 1139) the presence of oogonium-like bodies in cultures of the potato-rot fungus (*Phytophthora infestans*) was reported. In the present account the author states that under favorable circumstances it has been possible to obtain what appear to be fully matured resting spores of this fungus. These are found most abundantly where the organism is grown on potato gelatin or Lima-bean agar.

The author states that the oogonium-like bodies have apparently developed into mature resting spores, which have a thick spiny brown exospore with dense granular contents, bearing a general resemblance to the oospores of related species. As yet none of these resting spores have been germinated, so that it is not known positively whether they act functionally in that manner or not. No body comparable to an antheridium has yet been discovered.

The leaf curl of potatoes, P. DE CALUWE (*Handel. Vlaamsch Natuur en Geneesk. Cong., 12 (1908), No. 2, pp. 195–200*).—A description is given of the leaf curl of potatoes, a disease which has become quite prevalent and destructive in Germany, Holland, and elsewhere.

Notes on the leaf roll disease of potatoes, O. APPEL (*Jahresber. Ver. Angew. Bot., 6 (1908), pp. 259–265*).—An account is given of a leaf roll disease of potatoes, and the author states that probably several forms of disease are confused in this term. In 1905–6 a species of Fusarium was commonly found in diseased tissues, while in 1907 and also in 1908 *Verticillium albo-atrum* was present in the diseased stems. He thinks that this disease, instead of being of recent occurrence, has been known for some time, and states that there is evidence that it has been recognized for more than a century.

The leaf roll of potatoes, SCHLEH (*Fühling's Landw. Ztg., 58 (1909), No. 18, pp. 641–663*).—The author has carried on several years' observation and experimentation with this disease, seeking methods for its control. He concludes that the various forms, such as stunted growth, leaf curl, and crinkled leaflets, are all due to the same cause, the specific nature of which has not been positively determined. The disease is readily transmitted through the tubers, and its virulence seems to increase from generation to generation.

Fertilizers do not seem to influence the disease to any considerable extent, although some methods of culture seem to favor its development. Poorly developed tubers are more likely to spread the disease than sound ones. There is little evidence that the cause of the disease can be transferred from the tuber to the soil, yet as a precaution rotation of crops is advised.

The usual methods for combating plant diseases are said to have failed, and the author advises extensive experiments by potato growers to ascertain practical methods for the control of this trouble, which he states is becoming one of the most serious of potato diseases.

Internal brown rot (*Jour. Bd. Agr. [London], 16 (1909), No. 8, pp. 647, 648*).—A description is given of the internal brown rot or sprain of potatoes, the precise nature of which is obscure. In some specimens mycelium was found in the tissue of the brown spots, and under proper conditions the winter rot caused by *Nectria solani* always developed. In other cases no mycelium could be found, nor did any fungus develop even under favorable conditions.

Tubers showing this disease were planted, and every tuber produced showed the presence of small spots, indicating that the disease is transmitted from seed tubers to the following crop. Where there were no signs of winter rot on the tubers planted the sets produced a perfectly clean crop.

A preliminary account of this disease, suggesting a possible cause, has been noted elsewhere (E. S. R., 21, p. 447).

Sugar beet and potato diseases in 1908, A. STIFT (*Centbl. Bakt. [etc.], 2. Abt., 23 (1909), No. 6–9, pp. 173–192*).—A critical review is given of some of the more important contributions in 1908 relating to the diseases of sugar beets and potatoes, about 100 publications being considered.

The root rot of beets and its control, E. RIEHM (*Bl. Zuckerrübenbau, 16 (1909), No. 10, pp. 145–149*).—An examination of a large number of diseased beets is said to have shown the presence of 3 fungi, *Phoma betæ*, *Pythium debaryanum*, and *Aphanomyces lævis*, all of which from the nature and abundance of their occurrence must be considered parasitic.

Of the species observed the Phoma was found to be distributed through pycnidia on beet seed. The other fungi are soil organisms that attack the roots in the field. The disease is said to be primarily one of young beets and anything that tends to check their growth will make them more susceptible.

Experiments are reported in treating beets for the destruction of the Phoma pycnidia in which the seed was treated on 2 successive days for 10 minutes with water heated to 57° C. On account of the trouble in handling, this method is not considered practicable. Methods better adapted to extensive use are seed treatments in which the seed is soaked for various lengths of time in solutions of carbolic acid, formalin, Bordeaux mixture, copper-soda mixture, and copper sulphate solution. For soil treatment the application of lime has been recommended, but the author says its use is not always followed by good results, the crop in some cases being injured.

The orobanche on tobacco, Constancis (*Jour. Agr. Prat., n. ser., 18 (1909), No. 43, pp. 565-567, fig. 1*).—A description given of *Phelipæa ramosa*, a phenogamic parasite of tobacco, hemp, and tomatoes, and sometimes occurring on maize and grapevines.

The parasite is particularly troublesome in the southern part of France and is more abundant in dry years than in rainy seasons. In general it makes its appearance in the latter part of July or the first half of August, growing upon the roots of the tobacco plant. Its presence on the plant can be recognized by the discoloration, feeble growth, etc. The infection is through the presence of seed in the soil or in tobacco seed or through seeds scattered by insects, winds, or birds.

To prevent the occurrence of this pest the author advises the destruction of the orobanche plant before the seeds mature, deep plowing as soon as the tobacco has been harvested, and early seeding of tobacco in soil which is made as rich as possible so as to cause the crop to grow rapidly and become physiologically resistant.

Deterioration in wheat yields due to root rots and blight-producing diseases, H. L. Bolley (*N. Dak. Farmer, 11 (1909), No. 5, pp. 5, 6*).—The author states as his belief that the chief cause of the general reduction in yields of wheat in the Red River Valley of the Dakotas and Minnesota is due to the action of parasitic fungi, causing root rot, wilting and blighting of the straw and heads, and is not to be wholly attributed to the deterioration of the available plant food in the soil.

The æcidial stage of Calyptospora columnaris, W. P. Fraser (*Science, n. ser., 30 (1909), No. 779, pp. 814, 815*).—The author notes the collection of the æcidial stage of the blueberry rust (*C. columnaris*) on *Abies balsamea* in July, 1909. A Peridermium was found on the leaves of *A. balsamea* which agreed with the description of *P. columnare*, and Dr. J. C. Arthur determined the material as sent him as the æcidial stage of the blueberry rust. It is said that this is the first time it has been collected in North America.

The American gooseberry mildew and its distribution in East Prussia, A. Lemcke (*Arb. Landw. Kammer Ostpreussen, Nos. 20, pp. 5-14; 24, pp. 3-34*).—A description is given of the American gooseberry mildew (*Sphærotheca mors-uvæ*), and its distribution in East Prussia in 1907 and 1908 is traced.

Combating the gooseberry mildew, A. Lemcke (*Separate from Georgine, Land u. Forstw. Ztg., 1909, No. 39, pp. 6*).—Directions are given for combating the American gooseberry mildew, which include the collection and destruction of all diseased foliage, twigs, etc., and spraying the shrubs during the summer season. It is stated that Bordeaux mixture has not proved very efficient in controlling this disease and in its stead a one-half per cent solution of potassium sulphid is recommended for use. The spraying should be carried on from May to July at intervals of about 8 days.

Further studies on the callus disease of raspberries, T. Wulff (*Ark. Bot., 8 (1909), No. 4, Art. 15, pp. 6*).—In a previous publication (E. S. R., 20, p. 831)

the author has described the callus disease of raspberries, and attributed it to frost or other injuries. Since that publication attention has been called to some similar diseases, and a rose canker, due to *Coniothyrium fuckelii*, has been described (E. S. R., 20, p. 850) that in some ways seems to resemble the disease the author has been investigating. His previous investigations were repeated, but studies made of the material have shown that while the fungus *C. fuckelii* may be present in the older portions of the callus, it is thought to be there only as a saprophyte and that it is not the direct cause of the trouble.

Experiments in combating the downy mildew of the grape, G. LÜSTNER (*Ber. K. Lehranst. Wein, Obst u. Gartenbau Geisenheim, 1908, pp. 111, 112*).—A brief tabulated report is given of experiments for the control of the downy mildew of the grape, in which vines were sprayed with various strengths of Cucasa, a trade preparation, the base of which is copper, a copper-soda preparation, Tenax, sea salt, and milk of lime.

The best results were obtained where 1 or ½ per cent Cucasa or 1 per cent copper-soda mixtures were used. Sea salt and solutions of sea salt and milk of lime were without value in reducing the amount of disease and the yield of crops was materially lessened where they had been employed.

The early treatment against the mildew of grapes, J. GUICHERD (*Prog Agr. et Vit. (Ed. l'Est-Centre), 30 (1909), No. 21, pp. 621–624*).—Attention is called to the desirability of thorough spraying early in the season for the control of downy mildew of grapes, and the author thinks that for these earlier applications nothing is gained by reducing the strength of the fungicides. At this time the strongest fungicide should be used, while at a later period the use of more dilute ones will be found advantageous. The first application, which should be made just before the flowering period, is held to be the most important. The second application should be made after the falling of the flowers, but if there is evidence that the fungus is spreading rapidly and the flowering period is considerably delayed, it is stated that the second treatment could be made during the flowering period without serious injury.

In this connection attention is called to a form of copper called copper oxychlorid, which, it is claimed, is very efficient for use against the downy mildew.

A remedy for the gray rot of grapes, E. TOTAL (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 30 (1909), No. 43, p. 499*).—For the prevention of gray rot of grapes the author recommends a treatment which he claims is very simple and efficient. This consists of thinning the leaves on the north side of the vines and spraying with Bordeaux mixture to which soap is added to make it more adherent. The treatment should be made about July 25, or at the stage when the grapes have just about reached their full size. If the fungicide is thoroughly applied at this time the author claims that no further trouble may be anticipated from this disease.

The apple mildew and its control, J. ERIKSSON (*Prakt. Bl. Pflanzenbau u. Schutz, n. ser., 7 (1909), No. 6, pp. 73–77, figs. 5; 7, pp. 96–99, fig. 1*).—A description is given of apple mildew, caused by *Sphærotheca leucotricha*, or *Podosphæra leucotricha*, as it is now known.

For the control of this disease the author recommends collecting and burning the leaves and affected shoots, spraying with a 1 per cent solution of copper sulphate, or of potassium sulphid, together with the digging in of lime in the soil about the trees. In the spring before the leaves appear a thorough spraying should be given the trees, and this should be repeated after blooming. Particular attention should be paid to nursery trees, that infected ones are not transplanted.

Characteristics of apple-tree anthracnose, A. B. CORDLEY (*Better Fruit, 4 (1909), No. 4, pp. 13–17, figs. 6*).—The author describes the apple-tree anthrac-

nose due to *Glœosporium malicorticis*, and offers suggestions for its control, the information being largely based upon Oregon Station Bulletin 60 (E. S. R., 12, p. 58). In that bulletin the suggestions for treatment included late summer and autumn spraying with Bordeaux mixture or other compounds. Based upon subsequent observations the author states that he is inclined to believe that the summer sprayings may be omitted and that it is most important to have the trees thoroughly protected by a fungicide during November and December. In order to secure this result he recommends a thorough application of Bordeaux mixture soon after the fruit is gathered, to be followed after the leaves are off the trees with another application of Bordeaux or of lime-sulphur mixture.

Control of pear scab, R. E. SMITH (*Northwest Pacific Farmer, 39 (1909), No. 51, pp. 1, 16*).—Attention is called to the pear scab, which is becoming one of the most serious diseases of the pear on the Pacific coast. The author quotes extensively from California Station Bulletin 163 (E. S. R., 16, p. 887), and for the control of the disease he recommends spraying the trees thoroughly in February and March with lime-sulphur mixture or copper sulphate solution. When the buds have begun to swell the trees should be sprayed with a strong Bordeaux mixture, and as this is the most important of all the applications, particular effort should be made to have it thoroughly done. After the fruit sets about two sprayings with a 5:5:50 Bordeaux solution, to which some arsenical may be added, are recommended.

Diseases of the native plum, W. T. MACOUN (*Canada Expt. Farms Rpts. 1909, pp. 126, 127*).—Attention is called to two diseases of the native plum (*Prunus nigra*), a species extensively cultivated in Ontario and Quebec, where European varieties of plums can not be grown. The diseases are the leaf spot or blight (*Cladosporium carpophilum*) and plum pockets (*Exoascus pruni*).

Experiments have shown that these diseases can be controlled by the thorough application of Bordeaux mixture, and suggestions are given for its use. Where it is necessary to apply the fungicide after the fruit has become of considerable size, ammoniacal copper carbonate can be substituted for ordinary Bordeaux mixture, so as to prevent staining of the fruit.

Some diseases of citrus trees, H. S. FAWCETT (*Proc. Fla. State Hort. Soc., 22 (1909), pp. 75–88, pl. 3*).—Popular descriptions are given of scaly bark, withertip, foot rot, gumming, blight, scab, and smoky fungus, with suggestions for the treatment of the different diseases, so far as definite remedies are known.

Yellow spotting of citrus leaves, B. F. FLOYD (*Proc. Fla. State Hort. Soc., 22 (1909), pp. 88–93, pls. 2, figs. 2*).—A disease of citrus trees characterized by a greasy yellow spotting of the leaves is described. Little appears to be known of its history, and it is said that it may almost disappear in a locality and again appear after an interval. From the evidence at hand it seems that it belongs to the same class as frenching, melanose, dieback, and blight.

The symptoms of the disease are confined to the leaves, although a single instance has been found where the fruit was spotted. The typical spots are yellowish or golden in color, varying in size, and usually occurring between the main veins. The yellowish or golden color is more noticeable on the upper surface of the leaves, while on the lower surface the spot is often rough and projecting, thereby differentiating it from the yellowing due to other causes with which, it is said, it is frequently confused.

As yet no definite cause has been found for the disease. While inoculation experiments have given negative results, it is believed from field observations that it is transmissible to some extent.

The diseases and insect injuries of coffee, F. C. VON FABER (*Centbl. Bakt. [etc.], 2. Abt., 21 (1908), No. 4–6, pp. 97–117, figs. 12; 23 (1909), No. 6–9, pp.*

193–219, figs. 28).—Compiled accounts are given of the various fungus and other diseases to which the coffee plant is subject, 18 species of fungi and 1 alga being described as parasitic on the leaves, stems, roots, and fruits of the coffee plant. In addition several phenogamous plants are listed that occur as parasites or semiparasites. Notes are also given on the injury done by nematodes, snails, mites, insects, etc.

The coconut stem disease, T. PETCH (*Trop. Agr. and Mag. Ceylon Agr. Soc., 33 (1909), No. 1, pp. 73–75*).—On account of the possibility of the distribution of the spores of *Thielaviopsis ethaceticus*, the cause of the coconut stem disease, by water, coconut husks, and other means, the author has carried on some experiments to test the vitality of the spores and the possible means of distribution.

The spores were found to grow only in solutions containing sugar, and on this account the fungus is found only in the portions of the stem containing sugar in some form. The spores retained their germinative capacity for a considerable time, particularly if kept dry, and experiments showed that they were quite resistant to many chemicals.

The author believes that the disease is not as destructive or as rapidly disseminated as formerly stated, although it apparently causes considerable loss.

Some studies of nonparasitic plant diseases, P. GRAEBNER (*Ztschr. Forst u. Jagdw., 41 (1909), No. 7, pp. 421–431, figs. 5*).—Descriptions are given of the effect of frost during the growing period on the oak, beech, hemlock, and fir.

Gas injury to street trees, R. HOERNING (*Gartenwelt, 13 (1909), No. 46, pp. 545, 546*).—An account is given of the injury in Kiel to linden, locust, and elm trees by illuminating gas.

A new Exobasidium disease on azaleas, R. LAUBERT (*Handelsbl. Deut. Gartenbau, 24 (1909), pp. 466–468; abs. in Bot. Ztg., 2. Abt., 67 (1909), No. 20–21, p. 285*).—In 1908 in some of the Rhenish provinces a disease of cultivated azaleas appeared which the author has studied and found to be due to *Exobasidium* sp., a form apparently related to *E. discoideum* and *E. ledi*. The fungus seems to be able to attack species of Vaccinium, Rhododendron, and Azalea, producing similar characteristics, and for its control it is recommended that the diseased parts be cut out and the plants treated with Bordeaux mixture or sulphur.

The diseases of euonymus, E. FOEX (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 30 (1909), No. 46, pp. 614, 615*).—The author calls attention to the fact that under the term euonymus disease 2 diseases are confused, one caused by the scale insect *Diaspis euonymi*, the other due to the conidial phase of a mildew. For the control of the former the use of insecticides is advised, while for the fungus the application of solutions of permanganate of potash, carbonate of copper, or Bordeaux mixture is recommended.

A remedy for the mildew of euonymus, P. JANY (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 30 (1909), No. 43, pp. 499, 500*).—For the control of the powdery mildew of euonymus the author recommends dusting the shrubs with sulphur when the active growth is just beginning. One application has proved successful for several years in controlling this disease.

A nematode disease of chrysanthemums, E. MOLZ (*Centbl. Bakt.* [etc.], *2. Abt., 23 (1909), No. 21–25, pp. 656–671, pl. 1, figs. 2*).—The author describes a disease of chrysanthemums due to the nematode *Aphelenchus olesistus*. The nematodes infest the above-ground part of the plants, causing considerable injury.

Investigations have shown that chemical treatments that are sufficiently strong to destroy the nematodes also injure the plants. The best means of combating this pest is believed to be through the sterilization of the soil with

steam. Ten minutes' exposure of infected leaves to a temperature of 43° C. killed all nematodes. There is some evidence also that soil may be sterilized by the injection of carbon bisulphid. The amount used should be about 3 gm. of carbon bisulphid to 10 liters of soil.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

Cave vertebrates of America, C. H. EIGENMANN (*Carnegie Inst. Washington, Pub. 104, pp. IX+241, pls. 31, figs. 72; rev. in Nature* [*London*], *82* (*1909*), *No. 2089, p. 40*).—A study in degenerative evolution.

Protection of woodlands in Ireland, III, A. C. FORBES (*Dept. Agr. and Tech. Instr. Ireland Jour., 9* (*1909*), *No. 3, pp. 477–482, pls. 4, figs. 2*).—Directions are given for the protection of trees against domestic animals, rabbits, squirrels, and other small animals (E. S. R., 22, p. 162).

Methods of destroying rabbits generally adopted, A. CRAWFORD (*Jour. Dept. Agr. West. Aust., 18* (*1909*), *No. 9, pp. 633–638*).—Directions for making and using different poisons are given by the chief inspector.

Pathology and bacteriology of plague in squirrels, G. W. McCOY (*Jour. Infect. Diseases, 6* (*1909*), *No. 5, pp. 676–687*).—This report is based upon an examination of 70 plague-infected ground squirrels (*Citellus beecheyi*) which came under observation in California during the summer of 1909.

"Plague in the ground squirrel is a disease that is readily recognized by the gross anatomical changes it produces. The commonest lesion, and often the only one is a bubo. Many of the cases are probably examples of subacute or chronic plague. In many cases the bacilli found in squirrel plague are highly virulent for guinea pigs and white rats, in other cases the virulence is somewhat reduced. Smear preparations are negative for pest-like bacilli in the majority of cases. It is unsafe to trust to the cutaneous method of inoculation alone, as it will sometimes fail when the subcutaneous method yields positive results."

Field mice and their natural enemies, FRANCES PITT (*Country Life* [*London*], *26* (*1909*), *No. 673, pp. 737–739, figs. 4*).—Hawks, owls, foxes, stoats, weasels, and hedgehogs are mentioned as important enemies of field mice.

A preliminary report on tumors found in wild rats, G. W. McCOY (*Jour. Med. Research, 21* (*1909*), *No. 2, pp. 285–296*).—During the period from June 1, 1908, to May 15, 1909, about 100,000 rats were examined at the Federal Plague Laboratory, at San Francisco, Cal. Among these 103 were found which presented tumors suitable for examination.

The sarcomas of the liver are said to have been of special interest as these are usually associated with the presence of the parasite *Cysticercus fasciolaris*, a stage in the development of *Tænia crassicollis* found in the cat. This parasite is usually surrounded by a thin, translucent membranous capsule. When there is a distinct tumor formation the parasite is almost invariably dead and often partly disintegrated. Of the tumors of the subcutaneous tissue, which are reported in detail in tabular form, there were 16 fibromas, 1 lipoma, 5 sacromas, 9 fibroadenomas and adenofibromas, 19 adenomas, 4 carcinomas (including fibrocarcinomas and adenocarcinomas), and 2 cystic adenomas.

Notes on the birds of San Domingo, with a list of the species, including a new hawk, A. E. and A. H. VERRILL (*Proc. Acad. Nat. Sci. Phila., 61* (*1909*), *pt. 2, pp. 352–366*).—An annotated list in which 112 species are recorded. The avifauna of San Domingo is said to be remarkable for the number of species peculiar to the island, many of which are confined to special, isolated localities.

British birds for cages, aviaries, and exhibition, S. W. BIRCHLEY (*London, 1909, vols. 1, pp. XIV+302, pls. 45; 2, pp. VIII+234, pls. 52*).—Under the 72

species taken up descriptions are given of the parent birds, attractive qualities, habitation, catching, steadying and meting off, hand rearing, exhibition, food, nest and eggs, and countryside notes. Accounts are also given of the common ailments, their causes and cure, the molt, and the bird room, and of the cages, aviaries, and bird-room requisites.

The birds of Java and their economic importance, I and II, J. C. Koningsberger (*Meded. Lands Plantentuin, 1901, No. 50, pp. 107, pls. 60; Meded. Dept. Landb. [Dutch East Indies], 1909, No. 7, pp. 87, pls. 52*).—The species here considered are illustrated by plate figures.

A manual of Philippine birds, R. C. McGregor (*Manila: Bur. Sci., 1909, pt. 1, pp. X+412*).—Three hundred and seventy-eight species are recorded.

The American toad (Bufo lentiginosus americanus), N. Miller (*Amer. Nat., 43 (1909), Nos. 515, pp. 641–668; 516, pp. 730–745, figs. 7*).—The author here reports observations which were made continuously throughout the year on this toad under the headings spawning habits and seasons, development, habits, and food, hibernation and enemies.

Experiments conducted show that the toad eats on an average only once in 1½ days. It feeds entirely on animal matter, no food being taken unless it shows signs of life. It refuses no insects, worms, or slugs which it can swallow, and about 80 per cent of its food consists of harmful insects.

Toads are destroyed by all classes of vertebrates, by drought and winter, and the adults mainly by the sewer system of cities and towns. Examinations made of manholes in May showed that there were on an average 4 toads in each. At this rate it is estimated that for Worcester, Mass., alone there are no less than 24,000 toads caught and probably killed in this way annually, and it is believed that at least 50,000 toads perish there annually from this cause.

The author states that toads will breed in any numbers desired up to the limits of the insect food supply if given a pond or even a small pool insured against drying up during late spring and early summer, and from which natural enemies have been eliminated.

A bibliography of 42 titles is appended to the account.

The occurrence of Bufo columbiensis east of the Rocky Mountains, R. T. Young (*Proc. Acad. Nat. Sci. Phila., 61 (1909), pt. 2, p. 298*).—This toad is recorded from the eastern slopes of the Arapahoe Peaks and from the mountains west of Greeley, Colo. The author's records show it to occur in the Hudsonian zone, far above the upper limit of the Transition, where it has doubtless migrated from its original habitat.

Fungal parasites of men and animals, H. Coupin (*Atlas des Champignons parasites et pathogènes de l'Homme et des Animaux. Paris, 1909, pp. 137, pls. 58; rev. in Jour. Roy. Micros. Soc. [London], 1909, No. 5, p. 617*).—Illustrations are given in this atlas of the microscopic fungi known to cause disease or to infect animals, and of the higher fungi that are poisonous as articles of food.

The Laboulbeniaceæ and their parasitism of insects, F. Picard (*Abs. in Ent. Bl., 5 (1909), No. 1, pp. 18–20*).—A brief consideration of these fungi in their relation to insects.

On the flagellates occurring in the intestine of Glossina palpalis and in the intestine and proboscis of G. morsitans, A. Kinghorn and R. E. Montgomery (*Ann. Trop. Med. and Par., 3 (1909), No. 2, pp. 259–276*).—A record of observations.

Determination of the blood-sucking insects and arachnids, E. Sergent (*Détermination des Insectes Piqueurs et Suceurs de Sang. Paris, 1909, pp. 308+XII, figs. 230*).—A work intended for use in the identification of the important blood-sucking species.

The Colorado laws governing horticultural inspection, also regulations and formulas adopted by the State Board of Horticulture (*Ann. Rpt. Bd. Hort. Colo., 1908, pp. 85–100*).—The regulations and formulas adopted by the State Board of Horticulture and the Colorado laws governing horticultural inspection are accompanied by brief descriptions of the more important insect pests.

Report of the division of entomology and botany, W. SAUNDERS (*Canada Expt. Farms Rpts. 1909, pp. 37–64, pl. 1*).—The preface to this report gives a brief review of the work of the late entomologist and botanist, Dr. James Fletcher, whose death has been previously noted (E. S. R., 20, p. 600).

In an effort to prevent the introduction of the brown-tail moth in shipments of nursery stock 1,503,129 plants were examined in the provinces of Ontario and Quebec, largely fruit seedlings, apples, pears, plums, and cherries, either for grafting or budding. On these 196 nests were found, all on stock imported from France, 100 being on pears, 56 on apples, 28 on plums, 5 on quinces, 2 each on roses and spiraeas, and 1 each on the sugar maple, cherry, and *Prunus pissardi*.

An account of the brown-tail moth is reprinted from the report for 1906 (E. S. R., 19, p. 959). Experiments with hydrocyanic-acid gas to kill the larvæ of the brown-tail moth, by A. Gibson (pp. 48, 49), indicate that this gas can not be relied upon as a practical remedy for the pest in its winter condition.

The chief insects of 1908 are reported upon by A. Gibson (pp. 49–63). The wheat jointworm (*Isosoma tritici*) was present in considerable numbers in some parts of western Ontario. The grain aphis (*Macrosiphum granaria*) was very prevalent in many parts of Ontario and Quebec. The clover-seed midge (*Cecidomyia leguminicola*) was a source of considerable injury in districts of Ontario where clover is grown for seed. The hop flea-beetle (*Psylliodes punctulata*) again did extensive injury to hop plants in the large yards in British Columbia, where during the last 3 years, fully three-fourths of the hops grown have been destroyed by this pest. The Hessian fly and chinch bug did but little injury. The small white cabbage butterfly (*Pontia rapæ*) was prevalent throughout Ontario, Quebec, and New Brunswick. Pyrethrum, 1 lb. in 4 lbs. of cheap flour, was recommended as a remedy. Cutworms were present in injurious numbers in many districts throughout the Dominion, the dark-sided cutworm (*Paragrotis messoria*) and the red-backed cutworm (*P. ochrogaster*) being responsible for most of the damage.

In eastern Ontario and Quebec, the apple leaf hopper (*Empoasca mali*) very seriously injured potatoes, beans, and other plants. It began to make its presence apparent toward the end of June by causing the leaves of the attacked plants to curl up and turn brown. Potatoes which were sprayed with whale-oil soap or kerosene emulsion before the young leaf hoppers had acquired their wings were freed from the pest and not injured to any appreciable extent. As the pest feeds on the lower side of the leaves it was necessary, in order to reach them with a spray, to attach the nozzle to a short joint of pipe about a foot long, having an angle of about 45° in it. The severity of the outbreak was thought to have been influenced by the exceptional drought and heat which weakened the plants and made them more than usually susceptible to injury.

The destructive pea aphis (*Nectarophora pisi*) appeared in enormous numbers in August and caused serious injury to the pea crop. Various remedial measures were tried, the brush and cultivator method being found the most effective. Another method tried with considerable success consisted of using a brush which dislodged the insects so that they fell into a pan containing coal oil and water drawn between the rows of peas. In this way a bushel of

plant lice was caught to each row of peas 125 rods long. Whole fields of onions are reported to have been destroyed by root maggots, cabbages, cauliflowers, and radishes also being injured. In British Columbia, the maggots were still at work when the onions were taken up in the autumn.

The apple maggot continues to be prevalent in certain districts of Ontario and Quebec. The codling moth was again reported as very destructive in many districts of these provinces; in Canada, east of Toronto, there is usually but one annual brood, while west of Toronto there are two, the second of which is the more destructive. It has been found where the second brood occurs, that in addition to spring spraying it is necessary to band the trees with burlap, sacking, or other material which will form a refuge in which the caterpillars will spin their cocoons. From 20 trees banded in an orchard near Ottawa on August 15, 129 cocoons were taken when examined August 31, 157 during September, and 34 in October. Both the white-marked tussock-moth (*Hemerocampa leucostigma*) and the rusty tussock-moth (*Notolophus antiqua*), particularly the former, have been abundant in orchards in the Maritime Provinces for the last few years and in some instances have been the cause of considerable injury. Cankerworms did much damage in many of the Maritime Provinces, particularly in Nova Scotia. The pear leaf blister mite (*Eriophyes pyri*), which occurs in every part of Canada where the pear is grown, is steadily spreading in the apple-growing districts of southern Ontario.

A brief report of the apiary by D. D. Gray is appended.

Report of the government entomologist for the year 1908, C. P. LOUNSBURY (*Rpt. Govt. Ent.* [*Cape Good Hope*], *1908, pp. 55–70*).—In the plant and fruit import inspection, 50 winter webs of the brown-tail moth were found in a consignment of pear seedlings from France, and several lots of South Australian and Canadian apples were rejected on account of Fusicladium. Of the 192 nurseries registered, quarantine was placed on 22 as a whole or in part, owing to the failure to eradicate proclaimed pests. The codling moth regulations and the bee and honey regulations are briefly considered.

An imported woolled Persian sheep exposed to an attack of heartwater through the application of infected ticks developed the disease and died. It is considered that this test, if a safe criterion, shows that this class of sheep is quite as fatally susceptible to heartwater as the merino, and in this respect behaves quite unlike the ordinary black-headed Persian sheep, which takes the disease only mildly.

The Spanish codling moth parasite (*Calliephialtes messer*), introduced in January, bred well in confinement at first and a substantial colony of impregnated females was liberated under favorable conditions. The progress made during the year, however, was disappointing and the author is of the opinion that this parasite will be of no substantial benefit. Fruit fly parasites were received from West Australia, but, due to the great scarcity of the fruit fly maggots, they appear to have failed to have become established. The parasite (*Hunterellus hookeri*) of the brown dog tick (*Rhipicephalus texanus*), forwarded by this Department, failed to attack the Cape Colony ticks, but the host of the parasite will be bred in an attempt to induce the parasite to attack closely related species. Great success is said to have been achieved in multiplying *Blastophaga grossorum*, which is necessary for the natural pollination of edible figs. The red-winged locust was abundant near the coast throughout the Transkeian territories in the early part of the year and on the whole was much the same as in several years past. The brown locust, however, appeared in the voetganger stage only in inconsequent swarms, and at few places, south of the Orange River.

Since the Boer war the Argentine ant (*Iridomyrmex humilis*) has gradually spread outward from Cape Town into the suburbs and is also known to occur in the neighboring mainland towns of Stellenbosch, Paarl, and Wellington, and also at East London, King William's Town, Queenstown, and a few smaller places in the east of the colony. Although it is the popular impression that it was introduced in the enormous supplies of forage, etc., imported from Argentina during the war, a communication from a correspondent states that the pest has been well known for at least 15 to 20 years.

The black peach aphis (presumably *Myzus cerasi*) appeared in districts thought to be free from it. The melon aphis (*Aphis gossypii*) was again troublesome to calabash in one district. The mammoth scale (*Lophococcus maximus*), the largest species of scale known, seriously injured the M'sasa tree (*Brachystegia randii*) in the vicinity of Salisbury, Rhodesia.

Experiments with citrus stock and fungus diseases are briefly reported upon.

Treatment and observation of crop pests on the Pusa farm, H. M. LEFROY and C. S. MISRA (*Agr. Research Inst. Pusa [India] Bul. 10, pp. 42, fig. 1*).—Brief accounts are given of the insects which became of economic importance during the past 2 years and of the remedial and preventive measures practiced. Details of the occurrence of the various insect pests by months, from May, 1906, to April, 1907, appear in tabular form in an appendix (pp. 18–42).

Insect pests [in Fiji in 1908], C. H. KNOWLES (*Rpt. Agr. Fiji, 1908, pp. 20, 23–26*).—The banana weevil (*Sphenophorus sordidus*) was a source of some injury during the year. Carbon disulphid was found to be most effective in killing the insect, while not injuring the suckers or stools. Leaf miners were found in maize and Para rubber, the injuries to the former being small, due to parasites. Small borers (*Xylopertha* sp.) were found in the branches of cacao.

In an appended report on insect pests of coconut palms, mention is made of the small leaf moth (*Levuana iridescens*), leaf miner (*Promecotheca reichii*), leaf-stalk weevil (*Calandra* sp.), young coconut moth (*Harpagoneura complena*), large moth borer, and leaf-eating phasmids, and the injury which they cause.

Report of the government entomologist for the year 1908, H. C. PRATT (*Agr. Bul. Straits and Fed. Malay States, 8 (1909), No. 9, pp. 422–426*).—Insect pests of rubber, coconut, tapioca, paddy, and coffee are briefly noted.

Studies in the life histories of Australian Odonata, R. J. TILLYARD (*Proc. Linn. Soc. N. S. Wales, 34 (1909), pt. 2, pp. 256–267; 370–383, pls. 2*).—Studies on the life history of *Petalura gigantea* and *Diphlebia lestoides*.

The brown locust campaign, 1908–9, F. THOMSEN (*Transvaal Agr. Jour., 7 (1909), No. 27, pp. 521–526, pls. 3*).—Arsenite of soda spray sweetened with brown sugar and molasses was again used and found to be very effective against this locust.

A new spraying compound called locusticide was thoroughly tested and found to be very economical and effective. This compound readily mixes with cold water, no residue is left in the buckets after the operations are finished, and the locusts seem to be attracted by it and will not leave the sprayed areas.

Experiments were also made with a new by-product of sugar refineries called molascuit. This compound is made from the pith of sugar cane as it comes from the mill, being mixed again, after leaving the mill, with molasses. It was found that in localities far removed from water and stock good results could be obtained by mixing with arsenite of soda. White flags on which were printed general warnings were used to let the farmers know that poisonous sprays had been used for the locusts.

The various species of locust birds were of great assistance in the work.

Preliminary account of the life history of the leaf insect, Phyllium crurifolium, H. S. LEIGH (*Proc. Zool. Soc. London, 1909, I, pp. 103–113, pl. 1; abs. in Jour. Roy. Micros. Soc. [London], 1909, No. 5, p. 570*).—"The Phylliums are dependent upon a very warm and moist atmosphere, and are, therefore, more or less confined to the islands in the tropical zone; in all stages they are very similar, both in color and habits, to various plant structures."

Notes on termites, F. THOMSEN (*Transvaal Agr. Jour., 7 (1909), No. 27, pp. 512–520, fig. 1*).—In continuation of experiments previously noted (E. S. R., 19, p. 959) the author reports in detail investigations conducted to determine the value of different materials in protecting different kinds of wood from the attacks of white ants.

It was found that arsenic compounds are very effective. Pieces of wood treated with tar, creosote, and carbolic acid were found to be eaten at the second examination and these compounds can not be recommended for use. Tobacco extract, oils, and paints were found to be worthless for the purpose, as were also soaps, which are easily washed out by water. Pieces of wood which had been thoroughly soaked in a saturated copper sulphate solution withstood the attacks of termites, whereas those pieces that were only slightly treated were eaten. Other chemicals, including mercuric chlorid, calcium chlorid, sulphuric acid, sulphate of iron, sulphate of soda, hyposulphite of soda, carbonate of soda, alum, and salt, proved to be useless after 2 years' test.

Thrips in tea, H. M. LEFROY (*Agr. Jour. India, 4 (1909), No. 3, pp. 282–290, pl. 1; Indian Agr., 34 (1909), No. 9, pp. 281, 282*).—Thrips are said to injure tea shoots by scraping at the leaf, destroying the epidermis and projecting veins, weakening the leaf, and interfering with its nutrition, so that it becomes brittle and loses its fresh green color. The leaf and shoot do not usually die, but become unhealthy and remain stunted. Experiments with crude-oil emulsion, soap, and rosin compound have shown the last named to be the most effective and the cheapest.

The rice bug or paddy fly, C. DRIEBERG (*Ceylon Agr. Soc. [Pub.] 40, pp. 2, fig. 1*).—A brief account of *Leptocorisa varicornis* and methods of combating it.

The root louse of grapevines, D. GUNN (*Transvaal Agr. Jour., 7 (1909), No. 27, pp. 508–512, pls. 2, figs. 2*).—The presence of *Phylloxera vastatrix* was discovered toward the end of 1908 in a vineyard in the Pretoria district. It is thought to have been introduced from France on vines purchased several years before.

Contribution to the study of the biology of the Chermes, P. MARCHAL (*Compt. Rend. Acad. Sci. [Paris], 149 (1909), No. 16, pp. 640–644, figs. 3*).—This article deals with the sexual generation of the Chermes occurring on pines in the vicinity of Paris (*C. pini* and *C. strobi*).

A contribution to the knowledge of the scale insects and their dissemination, L. LINDINGER (*Ztschr. Wiss. Insektenbiol., 5 (1909), Nos. 4, pp. 105–110; 5, pp. 147–152; 6, pp. 220–225, figs. 9*).—The host plants, distribution, etc., of numerous species are noted. A genus and several species are described as new.

Some experiments on flacherie in the gipsy moth, W. REIFF (*Psyche, 16 (1909), No. 5, pp. 99–105*).—In this article the author first reviews the investigations of E. Fischer on the susceptibility of caterpillars to this disease, also known as flaccidenza and caterpillar cholera. He points out that Fischer has shown that the first tendency toward the disease arises upon a decrease in the nutritive value of the food of the caterpillars which suddenly induces a disturbance in metabolism. As a result the causative organisms immediately find conditions suitable for their growth.

Fischer's studies were with the nun moth (*Psilura monacha*), but with these at hand the author has conducted experiments with the gipsy moth which he here describes in detail. In the first experiment, in which caterpillars dead from the disease were distributed on trees infected by caterpillars in the third instar, 55 to 60 per cent died by the time of pupation. In a second experiment with caterpillars in the fourth instar, infected in a similar manner, 65 per cent were dead before the time of pupation. In a third experiment, in which caterpillars in the fourth instar were infected by painting the trunks of trees with a ring of a mixture of water, glue, and caterpillars dead from the disease, 63 per cent were dead at the time of pupation. In the fourth experiment a mixture similar to that used in the third was sprayed upon the foliage while the caterpillars were in the fourth instar, 70 per cent dying before the time of pupation. In a fifth experiment, in which dead larvæ were dried, powdered, and stirred into water and glue added to make the mixture adhere to the leaves upon which it was sprayed while the caterpillars were in the fourth instar, but 40 per cent died before pupation.

In all these experiments the pupæ still remaining were looked for later and it was found that an average of 10 to 15 per cent had died from flacherie. From these results the author concludes that the artificially produced flacherie can be utilized as a valuable aid in the destruction of gipsy-moth caterpillars. However, further experiments should be made on a larger scale to substantiate the results obtained.

In experiments with the brown-tail moth similar to those performed with the gipsy moth only 2 per cent of the caterpillars succumbed to the disease. Near Raymond, N. H., a wooded area was found where flacherie had broken out, especially among the tent caterpillars and those of various Noctuidæ, but in spite of the presence of the brown-tail caterpillars in large numbers a mortality of only 2 per cent by flacherie appeared among them.

A revision of the Arctianæ of Japan, T. MIYAKE (*Bul. Col. Agr., Tokyo Imp. Univ., 8 (1909), No. 2, pp. 153–174, figs. 6*).—Of the 32 species recognized as belonging to this subfamily, 8 are peculiar to Japan, 5 being found in Japan proper, and the other 3 limited to Formosa. Of the remaining 24 species, 14 are palæarctic, 7 oriental, and 3 common to both regions.

On certain Pieris caterpillars, W. T. M. FORBES (*Psyche, 16 (1909), No. 4, pp. 69–73, figs. 9*).—Breeding notes on *Pieris daplidice*, *P. brassicæ*, and *P. rapæ* are given.

Notes on the eggs of Epagoge sulphureana, R. L. WEBSTER (*Ent. News, 20 (1909), No. 9, pp. 389, 390*).—A specimen of this moth bred from a larva collected on apple nursery stock in Iowa is reported to have deposited 263 eggs.

A lepidopterous pest of coconuts, Brachartona catoxantha, H. C. PRATT (*Dept. Agr. Fed. Malay States, Bul. 4, p. 6; Agr. Bul. Straits and Fed. Malay States, 8 (1909), No. 8, pp. 357–362*).—Although the owners of coconut plantations in the Federated Malay States have had in the past but few insect pests to combat, with the exception of the coconut beetle, during the past 3 years *Brachartona catoxantha* has appeared in two widely separated localities. Its somewhat sporadic occurrence as a pest appears to be due to the diminution of its parasites, perhaps on account of the presence of a hyper-parasite. At Pusing Bharu, about 20 per cent of the third brood of caterpillars were found to be parasitized.

An account is given of the life history of the pest accompanied by descriptions of its stages. A period of 5 to 6 weeks is required for the completion of its life cycle from egg to moth and approximately 10 days for the appearance of another brood. Five broods may appear before the insect is reduced by parasites. Kerosene emulsion was found to be far more effective than London

purple and has the advantage of killing the scale insects with which the coconut trees are frequently infested.

The geographical distribution of butterflies, A. Pagenstecher (*Die geographische Verbreitung der Schmetterlinge. Jena, 1909, pp. IX+451, maps 2; rev. in Nature* [*London*], *81* (*1909*), *No. 2086, pp. 482, 483*).—The author finds that the geographical distribution of Lepidoptera, like that of plants, is closely connected with certain physical and organic factors. The most important physical factors are soil, temperature and light, moisture, altitude, and wind.

The first part of this work (pp. 3–61) is devoted to general observations on the geographical conditions of the continents, and the influence of mountains, desert and fruitful plains, the neighborhood of rivers and seas, continental and oceanic islands, etc., on distribution. The influence of temperature, moisture, atmosphere, etc., is briefly described; then vegetation, carnivorous habits, commensalism, etc. Sections follow on the distribution of Lepidoptera as affected by altitude, notes on migration, cosmopolitan species, and season dimorphism and local variation. The organic (physiological) factors of the subject are discussed, with special reference to former geological and climatic conditions, and some reference to fossil Lepidoptera. After some remarks on structure, and on the enemies of Lepidoptera, the section concludes with a summary of the Macro-lepidoptera of Central Europe (1626 species, according to Lampert), and a table of the species of Papilio found in the more important districts of the world.

The second part of the work (pp. 62–402) is devoted to the regions and subregions of the world as defined by Wallace, Sclater, and others, with some reference to the views of other zoologists and botanists on the subject. The various regions and districts of the world are then discussed, first with regard to their climatic conditions, and secondly with reference to the species of Lepidoptera known to inhabit them, of which, in many instances, very full lists are given.

The concluding part (pp. 403–448) deals with the geographical distribution of Lepidoptera under their families and genera. The book is illustrated by 2 outline maps, one indicating the regions and subregions of the world, as mapped out by Wallace and Sclater, and the other representing the Malay Archipelago from the Nicobars and Malacca to the Philippines, New Guinea, and North Australia.

Check list of the Lepidoptera-Rhopalocera of the Transvaal, with notes on some of the species, C. J. Swierstra (*Ann. Transvaal Mus., 1* (*1909*), *No. 4, pp. 235–299*).—Three hundred and sixteen species are listed.

The Rhopalocera of Java, M. C. Piepers and P. C. T. Snellen (*The Hague and London, 1909, pp. XXIV+65, pls. 4*).—In this, the first of a series of monographs of the families of the Rhopalocera of Java, the Pieridæ are taken up. Colored plates are given of many species. The 33 species recorded represent 8 genera.

A feeding habit of some Lourenço Marques butterflies, C. W. Howard (*Ann. Transvaal Mus., 1* (*1909*), *No. 4, pp. 224, 225*).—*Crenis boisduvali* is reported to have fed upon the apple and quince, causing the fruit to decay. Oranges and naartjes were attacked by the butterflies of the species *Charaxes neanthes* and *C. zoolina*, the butterflies being so numerous that often 7 or 8 were clinging to each orange and the ground beneath the trees thickly strewn with decaying oranges.

Influence of cold and moisture on Lepidoptera, P. Kosminsky (*Zool. Jahrb., Abt. System., Geogr. u. Biol. Tiere, 27* (*1909*), *No. 4, pp. 361–390, pls. 5; abs. in Jour. Roy. Micros. Soc.* [*London*], *1909, No. 5, p. 569*).—The pupæ of *Vanessa io*, *V. antiopa*, and *Porthetria* (*Lymantria*) *dispar* were subjected to moist sur-

roundings with little effect on coloration, marking, or scales. Moderate cold and moisture resulted in the scales of these and other species becoming narrower and smaller. In cases where the temperature was below zero, enlarged and broadened scales sometimes resulted, and there were changes in the coloring and in the antennæ of the female of *P. dispar*, which approached the male in appearance.

The flower-bud maggot of cotton (Contarinia gossypii), H. A. BALLOU (*West Indian Bul., 10 (1909), No. 1, pp. 1–28, figs. 9*).—The cotton growers in Antigua suffered serious loss in 1907–8 due to the attack of this cecidomyid. The egg has not been discovered, but is thought to be inserted in the tissues of the flower bud. The maggots are found in the flower bud among the essential organs. When very young buds are attacked the injury causes them to fall off, but larger buds seem to be better able to withstand the effects of the attack. In cases of severe attack the very smallest buds are infested, in which case the bracts surrounding them flare back instead of remaining closed. Buds, the bracts of which have flared, are always found to be injured and generally to contain the flower-bud maggot, and such buds invariably drop very soon after flaring.

It is believed that the maggots live and feed among the developing anthers in buds of all stages, but that when the buds drop or are picked off the plant they very soon leave the bud, the full-grown maggots to pupate in the ground and the younger ones apparently to find fresh feeding places. In February, the infestation in certain fields was as high as 100 per cent, so that during a period of several weeks no flowers opened and no bolls were formed. In March, in the same fields, many of the buds were escaping the attack and the new bolls formed in November were beginning to ripen, but these fields had lost about 4 months of bearing. During the month the attack continued but became less and less severe until with the continued dry weather it disappeared entirely in April.

Sactogaster rufipes was seen on nearly every flower bud and flower and may be a parasite of the pest. Two other species, a Catolaccus and a Leptacis, were also found in cotton fields. It is thought that these parasites were probably an important factor in bringing the attack to a close. Remedial measures applied were without result.

Observations on Culicidæ, B. GALLI-VALERIO and J. ROCHAZ DE JONGH (*Centbl. Bakt. [etc.], 1. Abt., Orig., 49 (1909), No. 4, pp. 553–558, fig. 1*).—The authors report the results of investigations conducted near Lausanne, Switzerland, in 1907–8. These include observations on hibernation, breeding places, blood sucking, oviposition, and experiments on the destruction of larvæ and nymphs.

Contribution to the study of the mosquitoes of Cuba, J. H. PAZOS (*Sanidad y Benefic., Bol. Of. Sec. [Cuba], 2 (1909), Nos. 1, pp. 29–64, fig. 1; 2, pp. 177–192, figs. 8*).—Forty-five species of mosquitoes are recorded from Cuba.

Investigations of muscid larvæ entoparasitic on arthropods, J. C. NIELSEN (*Ent. Meddel. [Copenhagen], 2. ser., 4 (1909), No. 1, pp. 128, pls. 4; rev. in Science, n. ser., 31 (1910), No. 788, pp. 195, 196*).—This paper contains descriptions of the metamorphosis of several species of Tachininæ and Dexiinæ, together with data on the biology of the larvæ.

Among the species considered are *Ptychomyia selecta* and *Bactromyia aurulenta*, which are parasitic on *Hyponomeuta euonymella*, *Panzeria rudis* parasitic on *Tæniocampa stabilis*, *Steiniella callida* parasitic on *Lina populi*, *Carcelia gnara* parasitic on *Malacosoma castrensis*, and *Tachina larvarum* parasitic on *Malacosoma castrensis*, and *Spilosoma lubricipeda*. *Panzeria rudis* is said to be viviparous, depositing its larvæ upon the full-grown larvæ of *Tæniocampa stabilis*. Two species parasitic on imagines were examined, namely, *Viviana cinerea*, which occurs in species of Carabus and in *Procrustes coriaceus* and

Ocyptera brassicaria parasitic on *Dolycoris baccarum*. The main results of the investigations have been summarized in English and are appended to the account.

In the review, C. H. T. Townsend, of this Department, calls attention to the fact that two of the author's species determined as *Tachina larvarum* and *Carcelia gnava* are not the same as those he has studied (E. S. R., 20, p. 456), and that the identifications must be incorrect.

The warble flies, G. H. CARPENTER (*Dept. Agr. and Tech. Instr. Ireland Jour., 9 (1909), No. 3, pp. 465–476, pl. 1, fig. 1*).—Further results in continuation of investigations previously noted (E. S. R., 20, pp. 582, 857) are reported.

While muzzling experiments conducted with calves during 1907–8 seemed to support rather strongly the theory of the maggot's entrance by the mouth, those carried on during 1908–9 tend to confirm the results of 1906–7 in favor of the theory that they enter through the skin. In the spring of 1908, 132 of the 194 cattle used in the previous experiments were still on the farm and had been left throughout the summer of 1907 without any kind of dressing or protection against the attacks of the fly. From these cattle 586 maggots were squeezed out, an average of 4.44 per beast, and a reduction of 58.8 per cent, which is believed to have been largely due to this treatment. It was found that yearlings were far more benefited during the spring of 1907 than either the cows or calves.

A maggot which emerged from the skin May 13, pupated and emerged as an adult (*Hypoderma bovis*) 40 days later. A second maggot of this species which emerged from the skin May 30 appeared as an adult in 31 days, as did also a maggot of *H. lineata*, which emerged from the host on May 24. The gullets of a number of heifers and bullocks 2 or 3 years old were examined. "In many of these maggots were found, and in most cases they were embedded in the connective tissue of the submucous coat, with the axis of the maggot lying along the direction of the gullet. In some the head of the maggot was directed upward, in others downward; most were near the stomach, but some were near the pharynx, as if they were wandering to and fro in the submucous coat for a period of several weeks. One was found lying in the cavity of the gullet, but no trace of perforation of the mucous coat could be detected. The effect of the maggot on the submucous tissue is to cause a small amount of yellow discoloration due to the formation of pus."

A new Gastrophilus larva in the horse, A. HENRY (*Bul. Soc. Cent. Méd. Vét., 86 (1909), No. 14, pp. 319–321, fig. 1*).—*Gastrophilus inermis* is reported to have been found to infest horses in the northwestern part of France. The larvæ live in the rectum in small compact colonies of not more than 50 at the most.

On the British species of Phora, II, III, J. H. WOOD (*Ent. Mo. Mag., 2 ser., 19 (1908), Nos. 223, pp. 164–168, fig. 1; 224, pp. 169–174, figs. 2; 225, pp. 215, 216; 227, pp. 253, 254; 20 (1909), Nos. 229, p. 24; 231, pp. 59–63; 233, pp. 113–120; 234, pp. 143, 144; 235, pp. 145–149, figs. 5; 236, pp. 191, 192; 237, pp. 193–195, fig. 1; 238, p. 240; 239, pp. 241–244*).—Descriptions of new species with tables for their separation and notes on species occurring in Great Britain are given.

Syrian and Egyptian diptera, M. BEZZI (*Brotéria, 8 (1909), pp. 37–65*).—One hundred and fifty-six species are recorded, of which several are described as new to science.

Poultry fleas and the red hen mite, F. V. THEOBALD (*Illus. Poultry Rec., 2 (1909), No. 2, pp. 92–94, figs. 2*).—The common fowl flea (*Ceratophyllus gallinæ*), which has been recorded from many other birds besides the domesticated fowl, the head flea (*Sarcopsylla gallinacea*), and the red hen mite (*Dermanyssus avium*), are briefly discussed. Although ticks are not very common

on poultry in England *Dermacentor reticulatus* has been found on turkeys and *Argas reflexus* on poultry, including pigeons.

Classification of the families of the Coleoptera of America, north of Mexico, R. HAYWARD (*Philadelphia, 1909, pp. 37*).—A key to the families of North American Coleoptera.

The twig girdler, W. A. MATHENY (*Ohio Nat., 10 (1909), No. 1, pp. 1–7, figs. 13*).—Notes on the biology of *Oncideres cingulatus* and its injury to elm, hickory, linden, honey locust, and persimmon are presented.

A buprestid and other Coleoptera on pines injured by heath fires in northwestern Surrey, G. C. CHAMPION (*Ent. Mo. Mag., 2. ser., 20 (1909), No. 239, pp. 247–251*).—*Melanophila acuminata, Criocephalus ferus*, and other Coleoptera found on or beneath pines (*Pinus sylvestris*) injured by heath and brush fires are noted.

Revision of the Coccinellidæ of Madagascar, A. SICARD (*Ann. Soc. Ent. France, 76 (1907), No. 4, pp. 425–482, figs. 59; 78 (1909), No. 1, pp. 63–134, pl. 1, figs. 44*).—New genera and species are described in this revision.

The principal ladybeetles in Hokkaido, H. OKAMOTO (*Hokkaido Agr. Expt. Sta., Dept. Plant Path. and Ent. Bul. 9, pp. 15, pls. 2, fig. 1*).—Eight species are considered.

Report on the sugar cane borer in the Moluccas, F. MUIR (*Hawaii. Planters' Mo., 28 (1909), No. 9, pp. 363–371, fig. 1*).—An account of a visit to the Moluccas and the Tenimber Islands in search of parasites of the sugar-cane borer (*Sphenophorus obscurus*).

In the Tenimber Islands the borer was found to be very numerous and to cause much damage to the sugar cane and various palms, but in Amboina it was not common, its numbers being kept down by several factors, notably 2 predaceous beetles, a histerid and an elaterid, and a tachinid. The histerid is said to lay single eggs in the vicinity of the borer larva, and when food is short will feed upon young leaf hoppers and other insects. The elaterid in the larval stages feeds upon the borer larva and pupa, is hardy, and can stand long fasts. The value of the tachinid as a death factor varies, according to the condition of the sago palms, from 25 to 90 per cent.

The borer was found in the Ceram sago palms but not in any great numbers. The conditions were about the same as in Amboina, the 2 beetle predators being rather rare, the tachinid fly fairly common. Out of 537 cocoons examined, 313 were attacked by the fly. In spots where no cutting or clearing had taken place the borer was very scarce and the percentage of cocoons attacked rose to nearly 90 per cent.

In Amboina, *Perkinsiella vastatrix* and a new species of leaf hopper were found, the former also occurring in the sugar cane in Ceram. As in Java and elsewhere, egg parasites appear to be an important factor in keeping these pests in check.

Combating Pissodes notatus, ECKSTEIN (*Ztschr. Forst. u. Jagdw., 41 (1909), No. 4, pp. 209–232*).—This is a report of investigations of the biology and methods of control of this pest.

European bark beetles and their coleopterous and hymenopterous enemies, R. KLEINE (*Ent. Bl., 5 (1909), Nos. 3, pp. 41–50; 4, pp. 76–79; 6, pp. 120–122; 7, pp. 140, 141*).—Host and enemy lists are given.

A further note on the Chilgoza bark-boring beetles of Zhob, E. P. STEBBING (*Indian Forest Rec., 1 (1908), No. 3, pp. 245–251*).—This paper discusses the steps taken by officers in charge of the Chilgoza forests of Zhob and Takht-i-Suleman, in combating the scolytid beetles *Polygraphus trenchi, Phlœosinus* sp., and *Pityogenes coniferæ*.

Revision of the Australian Curculionidæ belonging to the subfamily Cryptorhynchides, A. M. LEA (*Proc. Linn. Soc. N. S. Wales, 33 (1908), pl. 4, pp. 701–732*).—This part deals with Chætectetorus and some of the allied genera.

The chalcidoid parasites of the coccid Eulecanium nigrofasciatum, with descriptions of three new North American species of the subfamilies Encyrtinæ and Aphelininæ from Illinois, A. A. GIRAULT (*Psyche, 16 (1909), No. 4, pp. 75–86*).—Three species, *Anagyrus nubilipennis*, *Aphycus stomachosus*, and *Coccophagus cinguliventris*, bred in Illinois from the terrapin scale, are described as new to science. *C. longifasciatus* and *C. lecanii* are also recorded as having been bred from the terrapin scale. A bibliography of *C. lecanii* is appended.

Oligosita americana n. sp., a new chalcidoid of the family Trichogrammidæ from Illinois, A. A. GIRAULT (*Psyche, 16 (1909), No. 5, pp. 106–110*).—This new species reared from the eggs of a jassid (probably *Dorycephalus platyrhynchus*) is described under the manuscript name formerly given by Ashmead. A previous record of this parasite as bred from the eggs of an Isosoma is said to be based on error, the eggs of the jassid being found in the stems of Elymus along with the Isosoma larvæ.

A second cooperative study of Vespa vulgaris, comparison of queens of a single nest and queens of a general population, E. Y. THOMSON, JULIA BELL, and K. PEARSON (*Biometrika, 7 (1909), No. 1–2, pp. 48–63, figs. 2*).—In a biometric study of the wing of *V. vulgaris* comparison was made of 13 characters in the 2 wings between queens from 1 nest and queens of the general population. The remarkable decrease in the variability which Warren found for South African termites, namely reduction to about one-half, is found to hold also for wasps. For the first time the reduction due to selecting an essentially endogamous group for an indefinite number of generations is worked out theoretically, and it is shown that with the usual values of parental heredity, it could hardly exceed 0.8 as against the observed 0.5. The authors have further series in hand, and meanwhile hesitate to attribute the 0.3 difference solely to environmental conditions.

Ant communities and how they are governed, H. C. MCCOOK (*New York and London, 1909, pp. XVII+321, pl. 1, figs. 97*).—A popular account of the bionomics of the ants.

Ants and plants, K. ESCHERICH (*Tharand. Forstl. Jahrb., 60 (1909), pp. 66–96, figs. 2*).—The author discusses ants in their relation to plants, first, as enemies (pp. 68–80), then as protectors and propagators (pp. 81–96).

Ticks on the California ground squirrel, W. B. WHERRY and F. C. WELLMAN (*Ent. News, 20 (1909), No. 9, p. 376*).—*Dermacentor occidentalis* and a new species to which Banks has given the manuscript name *Ixodes æqualis* are said to have been found heavily infesting the California ground squirrel.

A new species of Hæmaphysalis from East Africa, C. W. HOWARD (*Ann. Transvaal Mus., 1 (1909), No. 4, pp. 219–223, figs. 10*).—The tick here described as new was taken from a bird (*Centropus burchelli*) in Portuguese East Africa. Males, engorged females, engorged nymphs, and engorged larvæ were found on the host at the same time.

Arthropods and their rôle in disease transmission, R. BLANCHARD (*L'Insecte et l'Infection; histoire naturelle et médicale des arthropods pathogènes. Paris, 1909, pt. 1, pp. 160, figs. 197*).—In this fascicle the acarids are considered, the greater part of the subject matter being taken up by the ticks. The first chapter (pp. 5–9) is devoted to a general account of the acarids; the second (pp. 10–37) to an account of the anatomy of the ticks; and the third (pp. 38–49) to their biology, and natural enemies.

In chapter 4 (pp. 50-157) the classification of the ticks is taken up, keys being given for the separation of the genera and species. Under each genus and species, bibliographical and synonymical references are given, as are also the common names which have been applied. Descriptions are given of the more important species with notes on their biology, distribution, and economic importance.

The Demodicidæ and Acaridæ (Sarcoptidæ), Parasitidæ (Gamasidæ), and Trombididæ are briefly considered in the 3 concluding pages.

The insect and allied pests of the hop, F. V. Theobald (*Jour. Bd. Agr. [London], 16 (1909), Nos. 7, pp. 555-571; 8, pp. 617-628, pls. 6*).—"Forty-two species only of true insects or hexapods have been found feeding on the hop in Britain, but of these only 7 are of any general importance, namely, three kinds of wireworm, or larval click beetles, the hop aphis (*Phorodon humuli*), the strig maggot (*Diplosis humuli*), the clay-colored weevil (*Otiorhynchus picipes*), and the frog hopper or jumper (*Euacanthus interruptus*). Others, such as the needle-nosed hop bug (*Calocoris fulvomaculatus*), fever flies (Bibionids), otter moth (*Hepialus humuli*), etc., are of only occasional and local importance, and several recorded here are isolated attacks only. Only one acarid occurs in sufficient numbers to do any harm, namely, the hop red spider (*Tetranychus althæa*). Two millepedes are found in hop roots, but some growers still doubt if they are the cause of disease, and say they follow upon it.

"One very important hop pest is the eelworm (*Heterodera schachtii*), causing 'nettle-head.' It is probable also that the common eelworm (*Tylenchus devastatrix*) plays some important part in the dying back of hops. . . . In all cases of Tylenchus attack in hops which I have seen in recent years the fungus *Fusoma parasitica* has been present, and it is a question whether the latter is the direct cause of disease or whether the eelworm makes the plant susceptible to this fungus."

Hop insects, F. Remisch (*Ztschr. Wiss. Insektenbiol., 4 (1908), Nos. 8-9, pp. 331-333; 10-11, pp. 363-368*).—A brief account of the insects affecting hops in the region about Saaz, Austria.

[Rice pests in India] (*Dept. Agr. Bengal, Quart. Jour., 2 (1909), No. 4, pp. 290-292*).—An abstract from the assistant entomologist's report of a tour in the Nadia district of India in search of rice pests.

Animal enemies and diseases of the sugar beet, A. Stift (*Bl. Zuckerrübenbau, 16 (1909), Nos. 3, pp. 35-39; 5, pp. 73-77*).—The literature issued during 1908 relating to the insect and other animal pests and to the diseases of the sugar beet is here reviewed.

Enemies of the orchard, V. Vermorel (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 30 (1909), Nos. 9, pp. 263-268; 11, pp. 316-319; 12, pp. 361-365; 13, pp. 393-396; 15, pp. 461-464, figs. 8*).—Insects attacking the pear and apple and methods of combating them are here discussed. The species considered are the brown-tail moth, the gipsy moth, *Bombyx neustria*, *Hyponomeuta malinella*, *H. cognatella*, *Cheimatobia brumata*, codling moth, *Cecidomyia nigra*, and *Anthonomus pomorum*.

Coffee and tea pests, R. D. Anstead (*Indian Planters Gaz., 52 (1909), No. 12, pp. 422, 423*).—A report of the coffee and tea pests following a tour of investigation through the Nilgiris.

The fauna of the cacao field, J. H. Hart (*West India Com. Circ., 24 (1909), No. 291, pp. 557-561, figs. 2*).—Thirty-four of the insects and mammals that occur in cacao fields in the West Indies are noted, mention being made of the nature of the injury caused and of the remedial treatment.

Some parasitic diseases of the cinnamon tree in Ceylon, D. Bois and C. Gerber (*Compt. Rend. Acad. Sci.* [*Paris*], *149* (*1909*), *No. 6, pp. 405–407*).—*Eriophyes boisi* is said to be the source of injury to *Cinnamomum zeylanicum*, two types of galls being described.

Insect and fungus injuries to forest trees, R. Beck (*Tharand. Forstl. Jahrb.*, *60* (*1909*), *pp. 1–65*).—The author here considers at length the injuries to forest trees by insects and fungi.

Fungicides, insecticides, and vermin killers, F. P. Sargeant (*Merck's Rpt.*, *18* (*1909*), *No. 11, pp. 294–296*).—An annotated list of the drugs and chemicals used in the preparation of insecticides, fungicides, and vermin killers employed in agriculture and horticulture.

Insecticides and fungicides, F. T. Shutt (*Canada Expt. Farms Rpts. 1909, pp. 178–190*).—The more important insecticides and fungicides are here discussed. Analyses made of arsenate of lead, acetate of lead, arsenate of soda, various commercial Bordeaux mixtures, lime-sulphur washes, agricultural bluestone, and formaldehyde solutions are reported.

Remedies for orchard and vineyard pests, C. P. Lounsbury (*Cape Town: Dept. Agr., 1909, folio*).—This is a wall chart in which are given the formulas and directions for the making and application of remedies for insect enemies and fungus diseases of fruits.

[Spraying to control aphis], W. T. Macoun (*Canada Expt. Farms Rpts. 1909, pp. 125, 126*).—Several mixtures were used in 1908 for the apple aphis, which appeared in great numbers on young trees. Flour emulsion, McDougall's insecticide and fungicide wash, V-2 fluid, Niagara brand lime-sulphur wash, target brand fungicide, and whale-oil soap were tested. Whale-oil soap and McDougall's insecticide proved the most effective, both apparently killing all the aphids hit.

Killing moths in vineyards, W. Bardel (*Mo. Cons. and Trade Rpts.* [*U. S.*], *1909, No. 350, p. 134; Daily Cons. and Trade Rpts.* [*U. S.*], *1909, No. 3610, p. 4*).—A brief account is given of experiments in which electric lights were successfully used in vineyards near Rheims, France, to kill the pyralid and cochylis moths.

Carbolineum as an insecticide (*Ztschr. Landw. Versuchsw. Österr.*, *12* (*1909*), *No. 6, pp. 513–544, chart 1*).—In part 1 of this account, J. Netopil reports a chemical investigation, and in part 2, L. Fulmek, B. Wahl, and H. Zimmermann report practical investigations conducted in the orchard.

Proceedings of the twenty-ninth annual session of the Colorado State Beekeepers' Association (*Ann. Rpt. Bd. Hort. Colo. 1908, pp. 101–118*).—A report of the proceedings.

Spring losses of bees, R. Beuhne (*Jour. Dept. Agr. Victoria, 7* (*1909*), *No. 8, pp. 500, 501, fig. 1*).—There is said tó be a considerable loss of bees in the spring in Victoria and New South Wales, due to a disease somewhat different from dysentery and known as dwindle. The bees apparently leave their hives in quest of stores and are unable to return, very largely because of exhaustion and chill in consequence of impaired vitality. This is deemed to be the result of malnutrition in the larval stage caused by a deficiency of protein in the pollen used in the preparation of the larval food.

Dysentery of the honey bee, M. Küstenmacher (*Centbl. Bakt.* [*etc.*], *2. Abt.*, *24* (*1909*), *No. 1–4, pp. 58–62*).—A brief account of this disease including methods of treatment.

Ants and bees as pets, P. Collins (*Sci. Amer. Sup.*, *68* (*1909*), *No. 1757, pp. 152–154, figs. 11*).—Several formicariums and observatory hives are described and illustrated.

Silkworms, F. LAMBERT (*Vers à Soie. Paris. [1909], pp. 191, figs. 47*).—A small hand guide to silk culture.

The cultivation of shellac as an agricultural product, H. M. LEFROY (*Agr. Jour. India, 4 (1909), No. 3, pp. 258–270, pls. 6; Indian Agr., 34 (1909), No. 9, pp. 271–273*).—An account of the shellac industry in India. Shellac produced by scale insects of the genus Tachardia is considered one of the most valuable of forest products.

FOODS—HUMAN NUTRITION.

Air, water, and food, ELLEN H. RICHARDS and A. G. WOODMAN (*New York and London, 1909, 3. ed., rev. and enl., pp. 278, figs. 15, map 1*).—According to the authors, in this third edition (E. S. R., 16, p. 580) the chapters on analytical methods have been considerably enlarged with a view to making the volume more adapted to the needs of the chemical and sanitary engineer as well as to the general student and householder. "In a subject so rapidly advancing the printed page can hardly hope to keep fully abreast of the times, but all the methods have been reviewed or modified, and tentative ones have been retained or dropped as experience has indicated their value."

The bibliography, which is a special feature, has also been brought up to date.

International Congress on Pure Foods and Alimentary Substances, L. M. DOUGLAS (*Nature [London], 82 (1909), No. 2088, pp. 25, 26*).—In this condensed account of the Second International Congress for the Repression of Adulteration of Alimentary and Pharmaceutical Products, held in Paris, the author has summarized data regarding the extent of the work carried on and some of the more notable decisions.

Quotations from his summary follow:

"Bread was declared to be the product resulting from the baking of dough made from pure wheat flour, with the addition of yeast, water, and salt. Any other product meant as a substitute for bread should not bear the name, and its composition should be declared at the time of sale. It was subsequently declared that the addition of baking powder, bicarbonate of soda, and tartaric acid were quite permissible and regular operations. Alum was entirely prohibited.

"Coffee was clearly defined as being only worthy of that name when derived from coffee berries and when free from any foreign mixture, such as chicory or any other substance. Cocoa, on the other hand, was not so easily defined. Long discussions on the composition of this product took place in the section, and it was agreed that it would be better to refer the matter to an international commission of experts. The main question was as to whether the addition of alkali to cocoa was justifiable or not. . . . The discussions on the subject in the hygienic section were prolonged and sometimes very heated, but in the final issue it was agreed that 2 per cent of alkali should be allowed. An international commission will consider the whole matter, as it appears that cheap cocoas are not only sophisticated with alkalis, but additions, which are simply adulterations, are common. . . .

"At the Geneva congress there seemed to be a feeling that the definition of pure butter was a political matter rather than a hygienic question, and the voting seemed to be between the fresh butter and the salt butter makers. Owing to the greater attendance at the Paris congress there was a greater body of opinion, hence the discussions were more prolonged, and, for that matter, more interesting. The first question was as to the empirical standard of 16 per cent of water, which, it was declared, was too low for general purposes. It was finally raised to 18 per cent.

"The next question was in connection with the use of preservatives, and it was shown that it was not possible to conduct an export butter trade over any great distance without the addition of some boron preservative. This addition was allowed, and classed as a regular operation, which means that it is now considered as necessary in the making of some kinds of butter as is the addition of salt, and need not, therefore, be declared. Colorings for food, confections, and liquids came in for considerable attention, and it was found impossible to resist the argument that the sale of many alimentary products depended to a large extent on their appearance, and the use of harmless colors was therefore permitted. Twenty anilins were specifically mentioned as being inocuous, and they embrace every shade used for food purposes."

Dairy products and eggs (*Indus. Lait. [Paris], 34 (1909), No. 44, pp. 817–820*).—The definitions for milk and other dairy products adopted by the above congress are quoted.

The regulation of commerce in food products and condiments in Switzerland (*Rev. Prat. Abattoirs, 2 (1909), Nos. 2, pp. 67–72; 3, pp. 123–129; 4, pp. 173–178; 5, pp. 217–220; 6, pp. 265–272; 7, pp. 326–331; 8, pp. 372–381; 9, pp. 430–433; 10, pp. 475–482*).—A summary of Swiss legislative enactments.

Report of the department of food and drugs, State Board of Health, from March, 1909, to October 1, 1909, H. E. Barnard (*Mo. Bul. Ind. Bd. Health, 12 (1909), No. 9, pp. 121–132*).—During the time covered by this report 1,423 samples of foods have been analyzed, of which 979 were found to be of standard quality and properly labeled, while the remainder were adulterated or misbranded. The samples consisted very largely of products commonly consumed during hot weather, such as ice cream, beverages, and milk.

"A large number of samples of prepared meats sold as sausage under various names were examined for starch and preservatives, and the percentage of adulteration of these goods was found to be very high."

A number of drugs were also examined.

The inspection of meat establishments for pickling and preparing meat, H. Martel (*Rap. Opér. Serv. Vét. Sanit. Paris et Dépt. Seine 1908, pp. 181–183*).—Data are given regarding French inspection work.

Horse flesh as food, H. Martel (*Rap. Opér. Serv. Vét. Sanit Paris et Dépt. Seine 1908, pp. 152–155*).—Statistical data are given regarding the consumption of horse flesh as food.

Concerning the constituents of meat extract, R. Engeland (*Ber. Deut. Chem. Gesell., 42 (1909), No. 11, pp. 2457–2462*).—The conclusion is reached that the carnitin of meat extract is α-oxy-γ-trimethyl amino butyric acid.

Milling and baking tests, C. E. Saunders (*Canada Expt. Farms Rpts. 1909, pp. 204–208, pl. 1*).—The yield and baking strength of flour and the color of bread were studied with several varieties of spring, durum, and winter wheats. In the author's opinion the data were insufficient for general deductions, but he considers that the high position taken by Marquis, a variety of spring wheat, is noteworthy.

The tests on the effect of storage on wheat and flour "confirmed in a general way the conclusions previously reached" (E. S. R., 21, p. 358).

From a special series of tests "it has been established thus far that when the material is kept over in the form of flour there is a more rapid improvement in color and in strength than when it is kept as wheat. The changes that occur are not always regular, and a few exceptional cases were found. In every instance, however, there was a gain in water-absorbing power, and as a rule this gain was considerable, amounting sometimes to more than 4 per cent after 16 months of storage. There was also invariably an improvement in the shape

of the loaf. In regard to volume of loaf some irregularities occurred for which no satisfactory explanation can be offered at present."

In studying the effects of dampness comparison was made with the original grain of samples of wheat wet for 5 minutes and samples damp for 10 minutes, for 20 days, and for 27 days.

"The conclusion which must be drawn from this series of experiments is that dampness in wheat although very injurious to its appearance does not necessarily injure, but under some conditions actually improves, the intrinsic value (to the baker) of the straight grade flour produced from it. No doubt injurious action of the moisture would commence earlier at higher temperatures than it did in this series of trials [in which in most cases the temperature was 40 to 58° F.], but on the other hand it should be remembered that the amount of moisture present in the wheat in these tests was greater than that usually found in 'damp' or 'tough' wheat."

It is stated that the determinations of the baking strength of flour have been made with what may be conveniently termed "plain" bread, that is, bread made with flour, water, yeast, salt, and a small quantity of sugar, a bread which is probably similar in character to that made in Canadian homes.

"Commercial bakers almost invariably add one or more ingredients to their dough either to produce some special effect on the lightness, color or flavor, or to make their product comply with the requirements of the law so as to be sold as 'fancy' bread. . . .

"Among the substances, other than water, yeast, salt, and sugar, which are sometimes added to the flour or dough in bread making, the following may be mentioned: Lard, butter, cotton-seed oil, milk, evaporated milk, malt flour, malt extract, diastase, and potatoes.

"All of these are quite unobjectionable, provided the bread produced satisfies the taste of the consumer."

Tests were therefore undertaken to determine whether the addition of such ingredients in bread making affected the strength of the flour. "In a general way it appears that most flours are affected similarly when any additional substance is added to the dough. There are cases, however, where one flour is improved in strength by the addition of some substance which produces little or no effect on another flour."

Flour bleaching by "nitrous fumes" (*Brit. Food Jour., 11 (1909), No. 130, p. 179*).—A brief account of the examination of flour for nitrogen as nitrites reported by the public analyst and medical officer of health for the county of Lanark.

New English method of bread making, F. I. BRIGHT (*Daily Cons. and Trade Rpts. [U. S.], 1909, No. 3634, p. 11*).—A brief note on a method of making bread which it is said includes pepsin in small quantities. It is claimed that this makes the loaf more digestible and does away with all risk of the bread becoming sour.

The survival of pathogenic bacteria in bread after cooking (*Nouveaux Remèdes, 1909, p. 454; abs. in Schweiz. Wchnschr. Chem. u. Pharm., 47 (1909), No. 46, p. 712*).—According to the data summarized, pathogenic bacteria may survive the heat of cooking in bread, and therefore the conclusion is reached that bread should be made entirely by machinery to avoid personal contamination.

Rice dishes (*Rice Indus., 11 (1909), No. 8, pp. 22–24*).—A collection of recipes.

Blanching vegetables, MAUREL and CARCASSAGNE (*Compt. Rend. Soc. Biol. [Paris], 67 (1909), No. 25, pp. 91–93*).—In this study of the amount of mineral matter removed by blanching, i. e., cooking in water for a short period, cab-

bage, Brussels sprouts, cauliflower, celery (both stalks and tubers), asparagus, corn, beans, white beans, and lentils were included, the cooking period being 30 minutes in each case. It was found that on an average 36 per cent of the total mineral matter originally present and 50 per cent of the potassium were extracted.

The loss of salt sustained when cereals and vegetables are cooked by boiling, MAUREL and CARCANAGUE (*Compt. Rend. Soc. Biol.* [*Paris*], *67* (*1909*), *No. 26, pp. 211–213*).—When wheat, barley, and maize were boiled for 3 hours the water contained 47 per cent of the total mineral matter and 49 per cent of the total potassium originally present. With white beans, lentils, and dried peas, the average amount of total mineral matter removed was 40 per cent and of potassium 72 per cent of the quantity originally present. With potatoes, the values were 61 and 54 per cent, respectively. A comparison of blanching white beans (see above) with complete cooking, showed that 34 per cent more of the total mineral matter and 16 per cent more of the potassium were removed by the longer cooking period. A similar comparison made with lentils gave corresponding values of 21 and 22 per cent.

From their investigations as a whole the authors conclude that wheat, barley, and maize cooked by boiling lose 1.5 gm. mineral matter per 100 gm. material, white beans about 2 gm., and potatoes about 1 gm.

Markets for cranberries (*Daily Cons. and Trade Rpts.* [*U. S.*], *1909, No. 3633, pp. 1–5*).—In this summary of data regarding the possibilities of extending the use of American cranberries in Europe some data are given concerning the utilization of this fruit in Europe, the demand for canned cranberries, and a German method of cooking them.

Fruits as carriers of micro-organisms, A. SARTORY and FILLASSIER (*Compt. Rend. Soc. Biol.* [*Paris*], *67* (*1909*), *No. 30, pp. 445–447*).—An experimental study of fruits exposed for sale in Paris streets showed that they carried on the surface a very large number of micro-organisms, the principal species found being *Penicillium glaucum*, *Rhizopus nigricans*, *Pyogenes aureus*, *Bacillus termo*, *B. subtilis*, and *Micrococcus candicans*. Washing removed a large proportion of the bacteria, as was shown by the diminished number found in the second and third wash waters as compared with the first. From the study as a whole the author concludes that the sale of fruits intended for consumption without cooking should be subject to regulation.

[Olive oil and cotton-seed oil in the Levant], J. L. BRODÉ (*Mo. Cons. and Trade Rpts.* [*U. S.*], *1909, No. 349, pp. 87–95*).—Information is summarized regarding the manufacture of olive oil, its use locally, and the increasing demand for cotton-seed oil for food purposes.

According to the author, "considerable olive oil is produced in the Levant. The natives are very fond of it and use it freely in many forms. It is not an uncommon sight to see a workman at his noonday meal take a half-liter bottle of olive oil and saturate his food with it. In the country in spring and summer the workman's lunch consists mainly of bread and raw vegetables covered with olive oil."

The caffein content of coffee and the loss of caffein in roasting, RIETER (*Schweiz. Wchnschr. Chem. u. Pharm.*, *47* (*1909*), *No. 45, pp. 692, 693*).—According to the data summarized coffee loses from 1.5 to 8.53 per cent of its caffein on roasting. Different sorts of coffee were studied and the conclusion was reached that it is not possible to determine the kind of coffee by noting the loss of caffein.

Coffee extract and coffee infusion, BERGER (*Schweiz. Wchnschr. Chem. u. Pharm.*, *47* (*1909*), *No. 45, pp. 691, 692*).—Data are summarized regarding the average size of portions and the caffein content of coffee served in hotels,

restaurants, etc., in Berlin. In the case of hotels, the portion of coffee served at breakfast contained on an average 0.256 gm. caffein and the portion served in people's kitchens, 0.0423 gm. The other samples examined ranged between these extremes.

Some investigations on the toxicology of tin, with special reference to the metallic contamination of canned foods, S. B. SCHRYVER (*Jour. Hyg. [Cambridge], 9 (1909), No. 3, pp. 253–263*).—The investigations reported were summarized in a publication previously noted (E. S. R., 20, p. 1155).

Tin poisoning, A. ECKARDT (*Ztschr. Untersuch. Nahr. u. Genussmtl., 18 (1909), No. 3, pp. 193–202*).—The acute poisoning with acetate, tartrate, and chlorid of tin was studied with a view to determining the distribution of the salts in the organism and their degree of toxicity. The inorganic salts were found to be the most toxic. The stomach was found to harbor more tin than the kidneys and liver, the only other organs examined.

The author also studied the rate of absorption of tin by cream cheeses which were wrapped in tinfoil. The amount which was taken up during the ripening process was very perceptible.

Diet as an element in increasing resistance, with special reference to the protein ration, J. H. KELLOGG (*Trans. 6. Internat. Cong. Tuberculosis, 3 (1908), pp. 740–764*).—The author has summarized data, some of it the result of his own investigations, which led him to conclude that "a low protein dietary, 0.80 to 1.00 gm. of albumin per kilogram of body weight per diem, is entirely consistent with health, vigor, and a high degree of efficiency and endurance, in health," and concludes further that a low proteid dietary is advantageous in the treatment of tuberculosis. See also a previous note (E. S. R., 21, p. 168).

Overfeeding and mineral metabolism, E. BIERNACKI (*Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. ser., 4 (1909), Nos. 12, pp. 449–455; 13, pp. 481–496*).—From the results of experiments with animals (dogs) which are reported, and earlier data (E. S. R., 20, p. 364), the author concludes that a diet with excessively high energy value due to large amounts of fat and carbohydrates (that is, the sort of diet which is often employed in the treatment of disease, and which is also characteristic of the diet of well-to-do classes), induces a retention of chlorin and more especially of sodium, calcium, and phosphorus. Of these calcium seems most easily retained. These deductions do not take into account a retention of nitrogen and water.

The author concludes further that the real reason for the retention of ash constituents in overfeeding with fat and carbohydrates is the small proportion of energy from protein to energy from nitrogen-free nutrients in the diet, and especially to fat calories.

The experimental data are discussed with reference to a low protein diet—that is, a diet with an unusual ratio of nitrogen calories to nitrogen-free calories. The author believes the results of his experiments show that such a diet can not be followed for a long time without a harmful effect upon the nourishment of body organs and tissues, and he does not think it possible to consider that metabolism is normal when the normal relation between nitrogenous and nitrogen-free constituents of the diet is disturbed both absolutely and relatively by lowering the proportion of energy supplied by nitrogenous foods.

Fish in the diet and its effect on the metabolism of phosphorus, calcium, and magnesium, B. J. SLOWZOFF (*Verhandl. Gesell. Russ. Ärzte St. Petersb., 1908–9, Nov.–Dec.; abs. in Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. ser., 4 (1909), No. 17, p. 669*).—Less uric acid and creatin were found in the urine on fish diet than on meat diet, while the amount of total nitrogen was increased. When fish was substituted for meat in an otherwise uniform diet

no change was noted in the metabolism of phosphorus. The absorption of calcium was diminished 5 per cent and the absorption of magnesium increased 8 per cent. The fish period was especially characterized by an increased excretion of calcium in the urine of nearly 60 per cent and of magnesium of nearly 44 per cent, in comparison with control periods.

The bearing of such facts upon invalid dietetics is discussed.

Daily menus for the school year and a dietary study for October (*Cheyney, Pa., 1909, pp. 48*).—It is stated that for 3 years the attempt has been made at the Institute for Colored Youth (Teachers' Training School) to furnish the pupils with properly balanced and wholesome meals at low cost, and in connection with this work the daily menus for the school year 1907–8 have been published with the results of a dietary study which covered the month of October.

The number of persons provided for was 60 and the average cost of the food per person per day for the year was 21 cts. It is stated that on an average the waste was 10 per cent of the food as purchased. According to the results of the dietary study, the food as purchased cost 18 cts. per person per day, while the food served supplied 98 gm. protein, 100 gm. fat, and 351 gm. carbohydrates per person per day, the total energy being 2,758 calories. The daily menus were fairly varied, meats, fruit, vegetables, dairy products, bread, and other cereal foods being used in the same combinations as commonly found on home tables. Meats and eggs were freely used, judging by the menus. According to the report all of the pupils improved in health and working energy on the diet.

A system of records has been devised for the storeroom, kitchen, and dining room, which, it is stated, enabled the management by actual measurement to exercise "the strictest economy in purchasing, preparing, cooking, serving, and preserving the food materials."

All of the pupils in the school assist in the work and the immediate direction of it is under a graduate from the domestic science course.

"The experiences of this effort have revolutionized the teaching of domestic science in this institute. The subject is now both practical and practicable, and we furnish our pupils skill as well as knowledge."

The school child's breakfast, W. C. Hollopeter (*Jour. Amer. Med. Assoc., 53 (1909), No. 21, pp. 1727–1730*).—Except in a very small proportion of cases, according to the author, poverty is not the real reason why children go breakfastless to school in this country. The appetite of children is capricious in the morning, the real cause for this being the bad hygienic conditions of the home and this should be taken into account in finding a remedy.

Of the 2,169 children questioned only 6 claimed to eat no breakfast. Sixty-eight per cent of the children ate bread, 35 per cent a cereal, 40 per cent eggs, and 18 per cent cakes, and 58 per cent drank coffee, 15 per cent milk, 11 per cent cocoa, and 11 per cent tea. Data are also given regarding other foods.

"In conclusion, while we can not draw a definite result from the analysis of so small a number of school children as to the quantity and quality of food taken for their breakfasts, we may infer that the school child has a chance—a poor one, indeed—for a breakfast; and the reason he has so poor a one is not that he has no food, but unfortunate surroundings to prepare him for this subject.

The paper is followed by a discussion.

Penny lunches, H. H. Bonnell (*Starr Centre Assoc. [Rpt.], 1909, pp. 18–20, fig. 1*).—The work of the year in serving penny lunches in Philadelphia in certain public schools is described. The average number of children served per day was 560. The foods served are enumerated and their estimated nutritive value reported.

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"The endeavor to supply children in the schools where these lunches are maintained with nutritious food at small cost has met with gratifying success."

The work is undertaken by a philanthropic association and an attempt is made through this school work to reach the pupils' homes and improve living conditions.

The feeding of school children, R. CROWLEY (*Pub. Health* [*London*], *23* (*1909*), *No. 3, p. 101*).—An account is given of the supplying of breakfasts and dinners to children during 1908 in schools in Bradford, England. There are in all 20 dining rooms where meals are served. The average cost of the food alone was 2.2 cts., and the total cost including all administrative expenses, 3.8 cts., per meal per child.

School canteens in Paris, L. BUTTE (*Rev. Soc. Sci. Hyg. Aliment., 5* (*1908*), *No. 3, pp. 573–616*).—The organization and management of the Paris system of supplying foods to school children is discussed and a large amount of statistical and other data summarized. The recommendation is made that the board of supervisors of school canteens in large towns should include physiologists, chemists, medical experts, and economists. The author also recommends that the pupils who receive food without cost should be served in a special room.

Free noonday meals for needy children, C. DRIESSENS (*Rev. Soc. Sci. Hyg. Aliment., 5* (*1908*), *No. 3, pp. 672, 673*).—A critical discussion of the French system of school canteens.

Public charity in relation to food, P. CORNET (*Rev. Soc. Sci. Hyg. Aliment., 5* (*1908*), *No. 3, pp. 557–561*).—In this discussion of the diet of the poor a number of daily menus are given together with the cost of the foods. The author concludes that the observed faults in the diet in such cases are due to insufficient food.

Cost of living—prices—wages, G. D. BAYLEY (*Handbook Brit. Guiana, 1909, pp. 579–581*).—Data are given regarding board, house rent, cost of domestic servants, and prices of various articles of food in British Guiana.

List, with local prices, of tools and implements and utensils used in the interior, G. D. BAYLEY (*Handbook Brit. Guiana, 1909, pp. 529–532*).—Detailed information is given regarding the kind and cost of camp utensils needed in the interior of British Guiana and a list of provisions estimated as necessary for 10 men for 4 months.

Cost of living in China, J. C. MCNALLY (*Daily Cons. and Trade Rpts.* [*U. S.*], *1909, No. 3650, p. 12*).—Information is briefly summarized regarding the increase in cost of foods and other household expenses in China, particularly for foreign residents, during the last 10 years.

Studies of the physiology and pathology of fat distribution, G. MANSFIELD (*Arch. Physiol.* [*Pflüger*], *129* (*1909*), *No. 1–2, pp. 46–62*).—Using dogs as subjects, the author determined the proportion of total fat and fat which could be extracted with ether in the blood, muscle, heart, liver, and brain under normal and pathological conditions.

Variations in the amylolytic power of the saliva of nursing infants, G. FINIZIO (*Rev. Hyg. et Med. Infant., 8* (*1909*), *No. 3, pp. 224–249*).—The data reported show that in normal infants the amylolytic power of the saliva from the first days after birth to 12 months is more marked in the earlier period than in the later. When a year old this amylolytic power of the saliva is little inferior to that of a child 2 or 3 years old, and perhaps not inferior to that of an adult. The amylolytic power of the saliva of infants of the same age is not always the same.

The iron content of the spleen, C. CAPEZZUOLI (*Ztschr. Physiol. Chem., 60* (*1909*), *No. 1, pp. 10–14*).—In the spleen as well as in the liver an iron-contain-

ing nucleoproteid is found with 2.32 to 2.68 per cent phosphorus. The amount of iron removable by cooking in water varies, being highest in the first broth, which shows from 1.48 to 2 per cent. The filtrate from the nucleoproteid contains from 20 to 25 per cent of the total amount removable in hot water.

Some observations on the study of the intestinal bacteria, A. I. KENDALL (*Jour. Biol. Chem., 6 (1909), No. 6, pp. 499–507*).—The author states that his purpose in this paper is to show in a general way the procedure and the use of media through which a more comprehensive idea of the significance of bacterial activity in the intestine may be obtained. In the data discussed he considers the subject from the standpoint of the interdependence of diet, bacteria, and the end products of bacterial activity which appear in the urine, and the methods of procedure outlined are based upon such relations.

"The nature of the diet practically determines the dominant types of intestinal bacteria, and these organisms in turn, acting upon the digestive products of the diet elaborate the end products of their activity which appear in the urine.

"With the exception of a few anaerobes (which derive their oxygen from the combustion of carbohydrates) the majority of the prominent types of the normal flora which develop on a protein diet grow luxuriantly in media free from carbohydrate, while those developing on a carbohydrate regimen grow poorly, or even not at all, unless carbohydrate is present. Hence by inoculating portions of the mixed fecal flora with gelatin and milk and observing the degree and rapidity of peptonization, it is possible to form a judgment of the character of the proteolytic flora. At the same time these media furnish conditions so favorable for the growth of these organisms that they can be regarded as selective for the isolation of the proteolytic flora.

"On the other hand, through the use of media containing carbohydrate, and particularly the acid dextrose broth, one obtains a fairly specific enrichment of the acidophilic flora, characteristic of a carbohydrate regimen.

"Furthermore, through the use of these selective media it is possible to form a judgment of the completeness of the bacterial response to the nature of the diet. For example, if the experimental animal is on a carbohydrate regimen, the presence or absence of growth in protein media will indicate the presence or absence of proteolytic bacteria, since the acidophilic organisms do not grow well in these media and can not, therefore, inhibit the growth of these organisms. Conversely, with a protein diet, the presence or absence of acidophiles may be determined by inoculating the mixed fecal flora into acid dextrose broth, which is unfavorable for the development of the proteolytic types. These determinations may be made roughly quantitative for the different types by inoculating definite amounts of the mixed fecal flora into appropriate media.

"The end products of bacterial activity which appear in the urine are important for two reasons: They indicate the types of bacterial activity in the intestinal tract, and their reproduction in artifical media by pure cultures derived from the intestinal flora furnishes strong presumptive evidence of the participation of these organisms in the process."

The fecal bacteria of healthy men, W. J. MACNEAL, L. L. LATZER and J. E. KERR (*Jour. Infect. Diseases, 6 (1909), No. 2, pp. 123–169, fig. 1*).—Experimental methods are outlined and the results reported of an extended study of feces, undertaken at the department of animal husbandry, University of Illinois, in connection with an experiment on the influence of cured meats upon human health.

"During the course of the work 266 stools were examined. About three-fourths of these serve as the basis of this paper."

The conclusions which were drawn follow:

"A homogeneous suspension of the bacteria of adult human feces may be readily prepared by making it sufficiently dilute, 1:100.

"In such a suspension the bacteria can be counted microscopically by an experienced observer, with a fair degree of accuracy.

"The gravimetric method of Strasburger for determining the quantity of fecal bacteria is more time consuming, but the method is capable of a higher degree of accuracy than the enumeration procedures. The separation of the bacteria should be done by fractional sedimentation in a high speed centrifuge, and requires careful work at every step.

"In the case of normal adult men, eating an ordinary mixed diet, the average number of fecal bacteria excreted daily is about 33×10^{12}; the average daily bacterial dry substance about 5.34 gm., and the daily bacterial nitrogen 0.585 gm., making up 46.3 per cent of the total fecal nitrogen. There is considerable individual variation in the average quantity of fecal bacteria even in persons taking the same diet.

"The results of enumeration do not correspond accurately with the results of gravimetric determination of the bacteria under different conditions. The fecal bacteria as individuals contain an amount of dry substance subject to considerable variation.

"The bacteria of the adult human feces are Gram negative for the most part, about 70 per cent of all the bacteria being Gram negative bacilli. Gram positive rods are constantly present.

"It is possible to recognize microscopically a number of morphologically different bacteria, present in such numbers that they must have resulted from multiplication in the intestine. . . . Therefore there are several species of bacteria whose normal habitat is the human intestine.

"Free spores are almost constantly present in considerable number in the feces. They are more numerous in dry stools as a rule. Diarrheal stools, however, sometimes show a very large number of free spores.

"Thin, flexible spirals are quite frequently present in normal stools, and under some conditions are very numerous.

"The direct quantitative determinations of the fecal bacteria furnish evidence of the extent and nature of the bacterial growth in the intestine. This seems to be a delicate index of intestinal conditions."

Some observations on a twenty-four hours' walking race, F. Cook, E. G. Schleisinger, and A. H. Todd (*Brit. Med. Jour., 1909, No. 2552, pp. 1526–1528*).—Cardiac condition, blood pressure, body weight, general appearance, urine, and food were studied in connection with a 24-hour walking race at Shepherd's Bush, London, September, 1909. The food taken during the race varied somewhat, but without exception the competitors' previous diet did not differ markedly from that of ordinary individuals. Nausea and other unpleasant symptoms were observed after eating during the contest, which the authors attribute to the use of carbohydrate foods, and they therefore recommend that in a contest of this character little or no food be taken during the period of physical exertion, though albumin water or some such preparation may be given to avoid the depressing mental effect consequent upon withholding all food.

"Soldiers bearing heavy clothing and equipment have frequently marched for many hours with no food, provided that a sufficiency of water is available. Experiments on animals, too, show that external work can be performed for some days on a water diet only." In other words, the individual should depend for his severe exertion upon the energy derived from his previous diet rather than from food taken during the period of work.

The effects of rapid and prolonged deep breathing, D. F. COMSTOCK (*Science, n. ser., 30 (1909), No. 779, pp. 804, 805*).—According to the author's observations, deep and violent breathing is a mental stimulant and has a marked effect in diminishing muscular fatigue. For instance, it was found that after deep breathing the number of times a difficult arm exercise with heavy weights could be repeated without fatigue was increased 30 per cent. An increase in pulse rate was noted while the rapid breathing was continued as well as the ability to hold the breath for a much longer period than was otherwise the case.

The new institute for animal physiology at the Imperial Agricultural College, N. ZUNTZ (*Landw. Jahrb., 38 (1909), Sup. 5, pp. 473–490*).—The construction, arrangement, and equipment of the institute for animal physiology are described and the plans for work outlined, including that at present undertaken and proposed lines of research with both men and animals.

ANIMAL PRODUCTION.

Handbook of animal feeding and feeding stuffs, E. POTT (*Handbuch der tierischen Ernährung und der landwirtschaftlichen Futtermittel. Berlin, 1907, vol. 2, pt. 1, pp. XVI+612; 1909, vol. 3, pt. 2, pp. XII+264*).—This work has been expanded into 3 instead of 2 volumes as announced in the first volume, previously noted (E. S. R., 16, p. 290). Volume 2 treats of green feeds in general, hay, straw, chaff and hulls of seeds, roots and tubers, fleshy fruits, grains, and injurious plants. In the third volume by-products and miscellaneous substances which have been used for feeding stuffs, such as coffee, alcohol, peat, salt, charcoal, drugs, snails, mussels, flies, and May beetles ground into meal, are treated in detail. The by-products include a great variety of substances of both animal and vegetable origin, such as distillery slop, beet leaves, molasses, castor pomace, and wastes produced in the manufacture of ivory-nut buttons, paper, and other industries. Throughout the work there are references to the literature on feeding stuffs.

Stock feeds, B. W. KILGORE ET AL. (*Bul. N. C. Dept. Agr., 30 (1909), No. 11, pp. 60*).—This contains the text of the new feeding stuffs law and analyses of 543 samples, including wheat bran, middlings and shorts, shipstuff, rye, molasses, alfalfa, rice feeds, beet pulp, peanut, linseed and cotton-seed meals, and poultry and mixed feeds.

Commercial feeding stuffs of Pennsylvania in 1908, F. D. FULLER (*Penn. Dept. Agr. Bul. 175, pp. 149*).—This bulletin contains the feeding stuffs law of Pennsylvania and reports chemical analyses of 1,257 samples of feeds, including cotton and linseed meals, malt sprouts, distillers' and brewers' grains, gluten, hominy and cerealine feeds, corn, bran, wheat, and oats, animal by-products, low-grade flour, and poultry, condimental, and mixed feeds.

Fodders and feeding stuffs, F. T. SHUTT (*Canada Expt. Farms Rpts. 1909, pp. 166–176*).—Analyses are reported of corn, wheat, oat, and pea products, cotton-seed meal, flax screenings, milk albumen, apple pomace, hay made from spike-rush (*Scirpus cæspitosus*), miscellaneous feeds, mangels, turnips, and carrots.

Bran, shorts, chop-feed, W. J. GERALD (*Lab. Inland Rev. Dept. Canada Bul. 191, pp. 49*).—This bulletin contains the text of the Canadian feeding stuffs law of 1909, and reports analyses of 545 samples of bran, shorts, and chop-feed.

Soy-bean cake (*Mark Lane Express, 102 (1909), No. 4078, p. 573*).—Notes are given on the growing importance of soy-bean cake as a feeding stuff, together with analyses of the bean and cake.

[Feeding experiments] (*Canada Expt. Farms Rpts. 1909, pp. 75–87, 268, 290–293, 337, 338*).—Data as to the work of the year are reported.

Experiments in beef production, J. H. Grisdale (pp. 75–87).—Data are reported on the cost of gains in short fed steers, in the production of baby beef, and the comparative value of several feeds in the economical production of beef. The roughage used generally consisted of clover hay, silage, roots and straw. Nine steers averaging 1,145 lbs. in weight fed a grain ration of bran, gluten, and oil meal for 100 days made an average daily gain of 2.77 lbs. per head at a cost of 5.61 cts. per pound. The net profit per steer was $13.67. Four yearlings averaging 472.5 lbs. in weight fed for 190 days on the same ration minus the oil meal made an average daily dain of 2.17 lbs. per head at a cost of 5.73 cts. per pound. The net profit per steer was $4.43.

In the baby beef experiment 5 steers weighing 504 lbs. each on a limited growing ration, of which the grain consisted of bran, gluten, oil meal, and corn for 393 days made an average daily gain of 1.23 lbs. per head at a cost of 5.5 cts. per pound, but there was a loss of $2.04 per head. Six steers weighing 593.3 lbs. each on a full fattening ration for 290 days made an average daily gain of 1.61 lbs. per head at a cost of 6.02 cts. per pound. The average profit per head was $5.19.

Three steers weighing 923 lbs. each, on a grain ration of bran and ground corn for 70 days, made an average daily gain per head of 2 lbs. at a cost of 8.15 cts. per pound. The net profit per steer was $1.47. Three steers weighing 735 lbs. each, on a grain ration of bran and oil meal for 70 days, made an average daily gain of 2.1 lbs. per head at a cost of 7.19 cts. per pound, and gave a profit per head of $1.26. Three steers weighing 837 lbs. each on a grain ration of bran, gluten, and oil meal for 70 days, made an average daily gain of 1.53 lbs. per head at a cost of 9.9 cts. per pound. There was a net loss of 12 cts. per steer.

Five calves dropped in 1907 weighing at the start about 84 lbs. each, fed a limited growing ration of which the grain consisted of bran, oil and gluten meals, oats, and corn made an average daily gain for 729 days of 1.24 lbs. per head at a cost of 4.66 cts. per pound. There was an average loss per steer of $2.05. Six steers weighing 106 lbs. each, on a full fattening ration containing the same ingredients, made an average daily gain in 626 days of 1.52 lbs. per head at a cost of 4.88 cts. per pound. The profit per head was $5.19.

Swine feeding experiments, J. H. Grisdale (pp. 82–86).—The aim of these experiments was to compare gluten, imperial feed flour, and a mixture of oats, oil meal and imperial flour as feeds for swine, and to obtain data as to the value of potatoes as a supplement to these feeds. The main feeding period lasted 42 days and there were 10 pigs in each lot. The basal ration consisted of barley and bran. The average daily gain on the supplementary ration of gluten and potatoes was 1.35 lbs. per head at a cost of 4.84 cts. per pound. On the gluten ration the average daily gain was 0.99 lb. per head at a cost of 6.11 cts. per pound. On the imperial flour and potato ration the average daily gain was 1.11 lbs. per head at a cost of 4.6 cts. per pound. On the imperial flour ration the average daily gain was 0.52 lb. per head at a cost of 8.41 cts. per pound. On a mixture of oats, imperial flour, and oil meal the average daily gain was 1.17 lbs. per head at a cost of 4.68 cts. per pound.

Cattle feeding experiment, A. Mackay (pp. 337, 338).—In this test western rye grass was compared with alfalfa. Two lots of 3-year-old steers weighing a little over 1,000 lbs. each were fed for 16 weeks a basal ration of corn and linseed meals. The lot receiving rye grass as a supplementary feed made an average gain of 228 lbs. and the cost $49.07 per head. On the alfalfa ration the average gain was 177 lbs. and the cost $51.07 per head. The net profit per head on the rye grass was $11.10, and on the alfalfa $9.81.

The management and feeding of cattle, T. SHAW (*New York and London, 1909, pp. XXXI+461, pl. 1, figs. 25*).—In this book, written for the practical feeder, the author's aim has been to cover the entire ground relating to the feeding and management of cattle from birth to maturity. There are also chapters on the special topics of finishing beef cattle, baby beef, marketing, growing and fitting for exhibition, stabling, dehorning, spaying and castrating, diseases, and injurious insects.

Live stock: Breeding and management, P. MCCONNELL (*London and New York, pp. 112, pl. 1, figs. 15*).—This contains a short description of the principles and methods of live stock farming, of each breed worthy of note, and of the directions in which further improvement may be expected.

The biologist's part in practical plant and animal breeding, J. W. HARSHBERGER (*Amer. Vet. Rev., 35 (1909), No. 3, pp. 254–265.*)—A paper read before the Pennsylvania Veterinary Medical Association, March, 1909, in which are discussed line-breeding, in-breeding, crossing, and the determination of sex.

The author reviews the great service which biologists like Darwin, Mendel, De Vries, and Marchals, have rendered to the practical breeder, and states that "the practical plant and animal breeder can not neglect to encourage the biologist in his pursuit of pure scientific investigation, because some of the apparently least practical research work may prove ultimately to be of the highest practical value."

A study of inheritance in mice with reference to their susceptibility to transplantable tumors, E. E. TYZZER (*Jour. Med. Research, 21 (1909), No. 3, pp. 519–573, figs. 2*).—This investigation was undertaken in order to determine if the susceptibility to an inoculable tumor is transmitted in accordance with Mendel's law. The results show that the successful transplantation of tumor tissue in mice is dependent upon three main factors—the method of inoculation, the character of the individual tumor employed, and the nature of the tissue upon which the tumor is implanted. The three factors are subject to great variation as well as other subsidiary conditions.

A tumor which originated in a Japanese waltzing mouse was transplanted for many generations in mice of the same variety, but invariably failed to grow when inoculated into common mice. Attempts to inoculate Japanese waltzing mice with the Jensen tumor were unsuccessful, and the Ehrlich "Stamme II" tumor in this variety developed more slowly and in fewer cases than in common mice.

The hybrids of the first generation of a cross between common albinos and the Japanese waltzing mice were found to be slightly more susceptible than the latter but less susceptible than common mice. The Japanese waltzing mouse tumor, on the other hand, grew more readily in these hybrids than in Japanese waltzing mice. The offspring of such hybrids were found, however, to be absolutely insusceptible to this tumor, as were mice of the third filial generation.

"Susceptibilty to an inocular tumor is neither, therefore, inherited in accordance with Mendel's law, nor are the results obtained from cross-breeding explained by any other known principle of inheritance.

"There is no correlation between any of the visible racial character and susceptibility to the inoculable tumors employed . . . It is found that the size of an animal does not influence the rate of growth of a tumor, except possibly in its late development. Tumors grow most rapidly in young animals in which body growth is greatest.

"It is possible that results of another sort may attend the cross-breeding of other varieties or breeds of mice, but from the data at hand it is apparent that the factor of race or, better, of blood relationship, is of considerable importance in the investigation of transplantable tumors."

Some effects of external conditions upon the white mouse, F. B. Sumner (*Jour. Expt. Zool., 7 (1909), No. 1, pp. 97–105, figs. 14*).—An inquiry into the effect of differences of temperature and humidity upon the post-natal development of the white mouse, the primary object being to test the question of the transmission of certain characters, is reported. Upwards of 400 individuals were used and the results showed that different temperatures operating throughout the period of growth did affect the dimensions of the tail, foot, ear, and probably hair. The tails of mice kept in a warm room were from 12 to over 30 per cent longer than those from mice kept in a cold room. The modifications thus artificially produced are such as have long been known to distinguish northern from southern races of mammals.

The reappearance in the offspring of artificially produced parental modifications, F. B. Sumner (*Amer. Nat., 44 (1910), No. 517, pp. 5–18, figs. 2*).—The offspring of the mice used in the experiment noted above were measured in order to determine quantitatively the effect of temperature on the next generation. It was found that the modifications of the parent persisted to some extent in the offspring. The author suggests several explanations which might account for these results and among others the possibility of the inheritance of acquired characters.

What basic principles of breeding are established by the methods practiced in England in the improvement of live stock? L. Hoffmann (*Arb. Deut. Gesell. Züchtungsk., 1909, No. 4, pp. IV+150*).—A description of the breeds of live stock which have originated in England and an account of the methods used by English breeders which led to their improvement.

Hornless cattle, J. C. Ewart (*Live Stock Jour. [London], 70 (1909), No. 1861, pp. 599, 600*).—The author refers to various theories that account for the origin of hornless cattle. Recent explorations in Turkestan and records from Babylonia lend support to the view that the same conditions which are thought to have reduced *Bos taurus* in size also caused the reversion to the ancestral hornless type.

The inheritance of horns and face color in sheep, T. B. Wood (*Jour. Agr. Sci., 3 (1909), No. 2, pp. 145–154, pls. 4*).—A study of Mendelian inheritance with crosses between Dorset Horn and Suffolk sheep.

The lambs of the first generation were identical whichever way the cross was made. All had speckled faces and legs. The rams showed horns immediately after birth, and in the ewes small scurs were formed on reaching maturity. In the second generation 7 rams had large horns, 7 round scurs, 3 loose scurs, and 4 no scurs, whereas of the ewes, 8 had no horns, 3 had large horns, and 1 round scurs. The distribution of face color was as follows: Three with pure white faces, 3 with pure black faces, 3 with white faces and black noses, 3 with white faces and black round the eyes, 3 with white faces and black on both eyes and nose, 1 with large irregular patches of black on the face, and 17 with more or less uniformly speckled faces.

These and subsequent notings show that horns are dominant in the male and recessive in the female. Neither the white nor the black face appears to be dominant. The black face is not a simple character. Woolly and bare heads appear to be a pair of characters which blend in the first cross but segregate again in later generations. There are a number of instances of recombination such as horns, woolly poll and face, and black face. Another example is the bare head and hornless character of the Suffolks combined with the white face of the Dorsets.

A difficulty encountered in these experiments was the slowness and lack of certainty in testing the females and the complicated nature of what were thought to be simple characters. Points of economic importance such as would

be likely to appeal to the butcher, the dealer, or the wool merchant, are hardly likely to turn out less complicated than horns or face color.

Improving Australasian sheep (*Live Stock Jour.* [*London*], *70* (*1909*), *No. 1858, p. 533, fig. 1*).—A statistical note on the growth of the sheep industry and the improvement of the fleece. The number of sheep is again increasing and it is expected the high level mark of 1890 will soon be reached. The average weight of the fleece in 1861 was 4.69 lbs., in 1901, 7.90 lbs. The weight has also increased since that time. Recent mutton types including Shropshire, Lincoln, Leicester, and Dorset Horn breeds have grown in popularity in South Australia.

Sheep at Bathurst Experiment Farm, R. W. PEACOCK (*Agr. Gaz. N. S. Wales, 20* (*1909*), *No. 11, pp. 1017–1028, figs. 34*).—An account of the results of cross breeding sheep for lamb and mutton suitable for export.

As a rule the second crosses were the best and the first crosses next. Those containing the greatest amount of English blood were the fattest, especially that of the Southdown. "As wool is of such importance in Australia, and carcasses the desideratum in England, it taxes the ingenuity of the breeder to combine the two in a practical manner. From the past experiences at this farm, the cross which appears to meet the requirements best as a dual-purpose sheep and one that can be bred without serious disadvantages is a Shropshire-English Leicester-Merino.

"For future experiments this cross will be used as the standard against which to measure other crosses."

The history of the mule-footed hog, W. J. SPILLMAN (*Science, n. ser., 30* (*1909*), *No. 780, pp. 855, 856*).—An abstract of a paper read before the Biological Society of Washington, November 13, 1909.

This hog differs from other breeds only in the coalescence of the ungual phalanges. This character appears to be dominant but is disadvantageous especially in heavy hogs. Experiments at the Indiana Station show that the breed does not possess immunity from hog cholera as has been claimed by some breeders.

The Lincolnshire curly-coated pig, C. S. PLUMB (*Nat. Stockman and Farmer, 33* (*1909*), *No. 10, p. 249, fig. 1*).—This is an account of an English breed of swine which has long been known but not recognized officially until 1907. It was first exhibited at the Smithfield show in 1908 where it made the highest average daily gain of any breed. It is said to be hardy and of the bacon class but is being promoted as a general purpose swine. The breed is described in the herd book as follows:

"The animal should be white, and coated with white curly or wavy hair (odd blue spots are not infrequently found upon the skin). Head not too long, nose straight and not dished, ears thick and pendent, but not falling over the eyes, with a fair distance between them, jowl heavy, shoulders deep and wide at heart, ribs well sprung, back straight and long, tail well set, the sides deep reaching nearly to the ground, belly parts thick and the whole carcass well supplied with lean flesh, hams well filled to hocks and standing on short, straight legs with plenty of bone."

The factor hypothesis in its relation to plumage color, C. B. DAVENPORT (*Amer. Breeders' Assoc.* [*Proc.*], *5* (*1909*), *pp. 382–385*).—It is stated that the old belief that "hybridization, in and of itself, leads to a reversion" should be abandoned and its place supplied by the "factor theory" according to which 2 elements upon uniting produce a new character.

"If in the ancestors these elements were united, the races having been evolved by separating the elements, then crossing the races will bring together again the elements and thus restore, so far as that one character goes, the ancestral

condition." Examples are cited from investigations on the inheritance of pigmentation in the plumage of fowls. Presumably each pigment in the plumage is due to a distinct chemical composition or condition and the question of the behavior of pigment color in heredity is a chemical question.

Atavism in guinea-chicken hybrids, M. F. GUYER (*Jour. Expt. Zool., 7 (1909), No. 4, pp. 723–745, pls. 4*).—The author describes hybrids obtained by crossing a Black Langshan cock with guinea hens. They possess a curious color pattern, not present in either parent, which consists of white, U-shaped vermiculations on a dark background. This, the author thinks, is a return to a generalized type of color more or less present in pheasants, peacocks, and other species of the same family.

Is there a cumulative effect of selection? R. PEARL and F. M. SURFACE (*Ztschr. Induktive Abstam. u. Vererbungslehre, 2 (1909), No. 4, pp. 257–275, figs. 4*).—This article contains data on the effect of selection on the fecundity of poultry previously reported from other sources (E. S. R., 21, p. 372). There is also a brief review of the history of biological opinion on this topic.

[Experiments with poultry], A. G. GILBERT (*Canada Expt. Farms Rpts. 1909, pp. 225–245, figs. 2*).—This report contains data on incubation experiments, the use of the cotton front poultry house, and on feeding and breeding for egg production.

In an incubation experiment, when hens were compared with incubators, the hens hatched 128 out of 245 eggs, and the incubator hatched 261 out of 545 eggs.

Frozen wheat was compared with sound wheat, using several lots of laying hens. In 1 lot of 11 White Plymouth Rocks, 469 eggs were laid in 9 months on a ration containing frozen wheat as compared with 657 eggs laid by a similar lot fed on sound grain. Seven White Orpingtons laid 181 eggs on a frozen wheat ration as compared with 214 eggs laid by a similar lot fed sound grain only. The fowls fed on sound grain also presented a more healthy appearance than the lot receiving the frozen wheat.

An experiment with chicks hatched in July indicated that late hatched chicks are undesirable.

From results obtained so far, breeding stock selected from good layers since 1905 has increased the average egg production.

Two years with poultry (*Mount Morris, Ill., 1909, pp. 148, figs. 60*).—A practical work intended especially for the beginner in poultry culture.

Practical poultry raising in British Columbia, R. W. HODSON (*Victoria: Dept. Agr., 1909, pp. 48, figs. 30*).—A pamphlet written for the practical poultryman on the various phases of the poultry industry.

Turkeys: Their care and management for exhibition or for market (*Quincy, Ill., and Buffalo, N. Y., 1909, pp. 94, figs. 73*).—A summary of the experiences of successful poultrymen in the mating, rearing, exhibiting, and judging of turkeys.

Incubation and brooding, E. B. HAWKS (*Clinton, Wis., 1909, pp. 52, figs. 6*).—A booklet containing information of special value to the beginner.

Artificial v. natural incubation, J. DRYDEN (*Amer. Breeders' Assoc. [Proc.], 5 (1909), pp. 380–382*).—The opinion is expressed that artificial incubation is responsible for more failures in the poultry business than any other one thing, and that the failure at the Maine Station to secure a higher egg yield (E. S. R., 20, p. 271) may have been due to a gradual lowering of vitality in the stock by artificial incubation.

Animals that should be introduced and bred for economic and profitable meat production, W. N. IRWIN (*Amer. Breeders' Assoc. [Proc.], 5 (1909), pp. 214–217*).—The author advocates the introduction of several of the smaller antelopes because they are hardy, easily tamed, give a variety to our meat diet,

and are small enough so that they can be used up without loss by the farmer's family during the warm months. It is suggested that the giraffe should be domesticated because its flesh is of the highest quality and being quite free from uric acid will keep without putrefaction longer than most other meats. The advantage of domesticating the white rhinoceros, the hippopotamus, and other species of African mammals is also pointed out.

New meat supply, J. L. Griffiths (*Daily Cons. and Trade Rpts.* [*U. S.*], *1909, No. 3653, p. 11; Live Stock Jour.* [*London*], *70* (*1909*), *No. 1858, pp. 521, 530*).—These report a successful shipment of chilled beef from Queensland to England, previous attempts from Australia and New Zealand having ended in failure. In this case the surface of the carcass was sterilized immediately after slaughter. The beef was 62 days in transit and sold at 8.5 and 9 cts. per pound for hindquarters, a little more than was paid for meat from Argentina. It is thought that this opens up a new era for cattle men in Australia, as higher prices are obtained than for frozen meat.

The horse exports and imports of 1908 (*Live Stock Jour.* [*London*], *70* (*1909*), *No. 1859, p. 548*).—These statistics show the average number of horses exported from and imported to foreign countries and British possessions.

The number exported was 51,730. The average value of the stallions was £203 19s. By far the larger number exported went to Belgium and the Netherlands, 627 coming to the United States. The number imported from foreign countries was 12,999, of which over 7,000 came from Russia, and the average value of stallions was £70 8s. 7d.

DAIRY FARMING—DAIRYING.

Dairying in Alberta, C. Marker (*Farmer's Advocate, 45* (*1909*), *No. 899, p. 1697*).—An account of the industry by the dairy commissioner.

The Government is assisting the farmer to get better dairy stock from the East by paying a part of the transportation expenses of the animals. There are 11 cheese factories and 54 creameries, 21 of the latter being operated by the Government on a cooperative plan. The output of cheese is increasing slowly, but in the past 2 years the output of butter (2,550,000 lbs. in 1909) has increased 70 per cent. Much of this increase has been made during the winter months. The entire amount is disposed of in British Columbia and the Yukon district.

Dairy farming on mixed land (*Live Stock Jour.* [*London*], *70* (*1909*), *No. 1859, pp. 554, 555*).—This contains data on the number of acres required to keep a cow in a good dairy district of Cheshire, England. On three typical farms the amount of land required varied from 2 to over 4 acres per cow.

Dairying in Württemberg, Trüdinger (*Württemb. Jahrb. Statis. u. Landesk., 1907, No. 2, pp. 68–97, figs. 2, dgm. 1, map 1*).—A statistical account which includes data from 1834 to 1907. During this period the increase in number of cows has kept pace with the increase of population. The average live weight and yield of milk per cow and the price of milk have also increased.

In 1907 there were 24.1 cows to 100 inhabitants and 41.9 cows to each 100 hectares (17 cows per 100 acres) of land. The total number of cows was 505,000, yielding 8,585,000 hectoliters (over 907,000,000 qts.) of milk. The goats numbered 71,000, yielding 390,500 hectoliters of milk. The average price of milk in 39 cities and towns was in 1896, 13.9 pfennigs per liter (about 3.5 cts. per quart) and in 1907, 16.4 pfennigs. About one-third of the milk goes to creameries and cheese factories of which there are 1,369, these making 9,640,000 kg. of butter, 9,500,000 kg. of soft cheese, and 2,590,000 kg. of hard cheese. These products are worth about 30,000,000 marks ($7,125,000) per

year. A colored map which accompanies the article shows the geographical distribution of dairy associations, creameries, cheese factories, and shipping stations for transporting milk.

The Vienna city creamery (*N. Y. Produce Rev. and Amer. Cream., 29 (1909), No. 3, p. 106*).—An account of the large cooperative milk depot in Vienna which was started in 1880 with 33 members and a yearly milk supply of 2,870,000 lbs.

In 1906 the membership had increased to 84, and the milk handled to 23,888,000 lbs. The average price paid to members f. o. b. cars in Vienna for 1906 was 3.766 cts. per quart. The working expenses amounted to 1.434 cts. per quart. The price received at the stores was about 5.28 cts. per quart and when delivered at the homes 6.9 cts. Thirty per cent cream sells at about 48.72 cts. per quart, 16 per cent cream at 24.36 cts., and 10 per cent cream at 16.24 cts. The butter is sold at 29.5 cts. per pound the year round.

The possibilities of China as a market for dairy cattle, H. W. HOULDING (*Horn and Hoof, 2 (1909), No. 5, pp. 9, 10*).—An account of a herd of 6 dairy heifers taken to North China and kept on a mission farm. The natives in that section have never tasted cow's milk and the author thinks there is a good opportunity for dairying. Already there is a demand for canned butter.

Condensed milk trade (*Mo. Cons. and Trade Rpts. [U. S.], 1909, No. 350, pp. 107–114*).—Notes on dairying in foreign countries with special reference to its effect on the condensed milk trade.

The consumption of condensed milk in Brazil, British India, and Siam is constantly increasing, but only a small quantity is imported to these countries from the United States. Ecuador and Venezuela use only a small amount. In Santo Domingo and Mexico there are good fields to increase the trade. In Japan the imports increased from 173,467 dozen cans in 1899 to 909,160 dozen cans in 1908, one-half of which came from the United States. The imports of condensed milk to South Africa are decreasing because of the home production of dairy products.

Dairy investigations in County Durham and the northeast of England (*Durham County Council, Ed. Com., Rpts. Dairy Invest., 1909, pp. 146, dgms. 3*).—These investigations on composition of the milk and feeding for milk production have been previously reported from various sources.

[Records of dairy cattle], J. H. GRISDALE (*Canada Expt. Farms. Rpts. 1909, pp. 67–75*).—This contains data of milk produced, percentage of fat in milk, and the cost of feed for 49 cows kept at the Central Experimental Farm. The cost of production for milk ranged from 52.2 cts. to $1.67 per hundred pounds, and that of butter from 12.3 to 26.5 cts. per pound.

The variation in the composition of milk, A. LAUDER and T. W. FAGAN (*Edinb. and East of Scot. Col. Agr. Bul. 19, p. 38*).—This contains data on the yearly milk production and percentages of fat of a herd of 26 cows. Experiments with free and restricted ventilation showed no great differences in the yield.

The effect of imperfect milking on lowering the fat content of the milk, H. HÖFT (*Ztschr. Untersuch. Nahr. u. Genussmtl., 18 (1909), No. 9, pp. 550–553*).—A review of investigations on this subject.

Seasonal deviations in the fat content of cow's milk, C. H. ECKLES (*Milchw. Zentbl., 5 (1909), No. 11, pp. 488–502, figs. 6*).—Data obtained from 240 lactation periods of cows at the Missouri and Iowa experiment stations are presented in tabular and graphical form to show the variation in fat content. In nearly all cases the lowest percentage of fat occurred in June or July regardless of the date of calving.

On the nature of the cellular elements present in milk, R. T. HEWLETT, S. VILLAR, and C. REVIS (*Jour. Hyg. [Cambridge], 9 (1909), No. 3, pp. 271–278*).—A review of investigations and theories on the cellular structure of the udder, the formation of milk in the udder, and the nature of the cellular elements found in milk.

The authors agree with Winkler (E. S. R., 20, p. 1179), and Michaelis (E. S. R., 10, p. 282) that the cells found in normal milk are not leucocytes but young epithelial cells and cells of the germinal layer which have been thrust into the lumen of the alveolus. They are not amœboid, do not ingest bacteria, and do not stain like leucocytes. The majority of the multinucleated cells are different from the polymorphonuclear leucocytes. Leucocytes and lymphocytes do appear in the milk, however, in the advanced stages of mastitis.

On the composition of tuberculous milk, MONVOISIN (*Rev. Gén. Lait, 8 (1909), No. 2, pp. 25–35*).—Results of analyses agreed in general with data previously reported (E. S. R., 18, p. 368). The slight rise in total nitrogen was due to a larger percentage of albumin, as the casein content was very much reduced. The content of ash was slightly increased due to a large increase of sodium chlorid. There was a decrease of calcium, potash, and phosphoric acid. The variations from normal milk were more pronounced when the mammary glands were affected.

Physiology of Bacterium lactis acidi, L. BUDINOV (*Vyestnīk Bakt. Aghron. Stantzīī V. K. Ferreīn, 1909, No. 15, pp. 129–148, dgms. 4*).—The author studied the multiplication at 30° C. during 24 hours of *B. lactis acidi* in milk and meat-peptone bouillon containing milk sugar, observing also the rate of decrease of the milk sugar and the increase of the acidity of the substrata. He found that in milk the maximum development took place during the first 18 hours, when the quantity of germs in a cubic centimeter of milk reached the enormous figure of 34.2 milliards. From that time the number decreased to 2.2 milliards at the end of 24 hours. Energetic destruction of milk sugar began only after 6 hours, with an accompanying increase of the acidity of the milk. In the bouillon with milk sugar the development proceeded somewhat differently, although the development was also energetic from the beginning. However, at no stage did it reach the high figures obtained with milk, and when the maximum was reached after 18 hours, this maximum was maintained for some time (up to 24 hours).

The author further studied the multiplication and the dying out of *B. lactis acidi* at different temperatures. Inoculations of pure cultures of *B. lactis acidi* were made in sterilized milk which was then kept at 30°, at room temperature, and at temperatures below 0°. It was found that at 30° most of the microorganisms were destroyed in 9 days, and that at room temperature a marked decrease of the organisms was observed after 18 days, but that at temperatures below 0° the number of organisms remained the same during the entire month of the experiment. Repeated freezing with subsequent thawing of the milk cultures did not affect the germ content.

Some data and observations on the so-called Bulgarian micro-organism and the lactic acid preparation "lactobacillin," S. SEVERIN (*Vyestnīk Bakt. Aghron. Stantzīī V. K. Ferreīn, 1908, No. 14, pp. 101–131*).—A critical survey of the literature leads the author to the conclusion that Rist and Khoury were the true discoverers of the micro-organism in question and therefore he adopts for it the name *Streptobacillus lebenis* proposed by the discoverers.

Attention is called to the fact that there are two races of the Bulgarian micro-organism—one inducing, along with energetic lactic acid fermentation, abundant sliminess in the milk, and another causing no sliminess during the lactic-acid process. A careful study of the cultures has convinced the author of the full

identity of the slime-producing and nonslime-producing micro-organisms as one species and with the species *S. lebenis* of Rist and Khoury.

Results are given of a bacteriological analysis of commercial preparations of lactobacillin. In no one of a number of samples examined was the Bulgarian micro-organism the most important constituent found. The dry preparations contained no living organisms.

Does the Bulgarian micro-organism occur in Don and Caucasian sour milk? I. Makrinov (*Vyestnīk Bakt. Aghron. Stantzīī V. K. Ferreīn, 1909, No. 15, pp. 17–36*).—In the Don curdled milk the author did not find the Bulgarian micro-organism, though isolated a rod-like micro-organism which resembled it in some respects, but which did not induce the lactic-acid process. Microscopic observations always showed the presence of a streptococcus which the author has not succeeded in isolating, but he suggests that the specific exciter of the lactic-acid process in the Don curdled milk is the streptococcus discovered by Weigmann in the Dutch viscous milk (*Streptococcus hollandicus*).

From the Caucasian sour milk, the so-called "mazun," a lactic-acid micro-organism identical with the Bulgarian organism was isolated, and two races of the micro-organism, slimy and nonslimy, were found as by Severin (see above) in "yoghourt" (Bulgarian sour milk).

Lactic acid stimulator of the Don curdled milk, I. A. Muravyev (*Vyestnīk Bakt. Aghron. Stantzīī V. K. Ferreīn, 1909, No. 15, pp. 149–157*).—The author studied the same sample of curdled milk investigated by Makrinov, as noted above, and in general confirmed his results. He did not find the Bulgarian micro-organism in the curdled milk, and he showed that the specific stimulator of the milk was a streptococcus which he succeeded in isolating in pure culture. A detailed study of this streptococcus showed it to be very similar to *Streptococcus hollandicus*, from which it differs only in the fact that it could not be grown on meat-peptone media.

Observations on certain lactic acid bacteria of the so-called Bulgaricus type, B. White and O. T. Avery (*Centbl. Bakt.* [etc.], *2. Abt., 25 (1909), No. 5–9, pp. 161–179, pls. 2, figs. 1*).—A review of the morphological, cultural, and biochemical features of the lactic producing bacilli obtained from yoghourt, mazun, and "leben" led the authors to conclude that they should be classed as a single group identical with *Bacterium caucasicum*. The significant variations exhibited by these bacilli in regard to the presence or absence of granules demonstrable by differential stains, the degree of lactic-acid production, and the nature of the lactic acid formed suggests a further differentiation into 2 distinct types. These types might be designated as the true type and the para type.

Comparative study of the bacterial population of the Russian-Swiss and the Emmental cheeses, II, L. Budinov (*Vyestnīk Bakt. Aghron. Stantzīī V. K. Ferreīn, 1908, No. 14, pp. 43–99, dgms. 3*).—An earlier paper on this subject by the author was published in 1903 (E. S. R., 16, p. 506). The results of the investigations here reported were in brief as follows:

The bacterial population of the Russian-Swiss cheese grows rapidly during the first month and then begins to fall off comparatively slowly. The number of organisms in the crust layer is less than in the interior of the cheese, except in cheese one month old, where there is a uniform distribution. In the bacterial population the first place, quantitatively, is occupied by a lactic-acid organism closely resembling *Bacillus casei* of Freudenreich; followed by *Bacterium lactis acidi;* and a Micrococcus which peptonizes gelatin and is close to *M. casei liquefaciens*, separated by Freudenreich from the cow's udder and from Emmental cheese. Besides these main organisms of the Russian-Swiss cheese

there occur, sporadically, some other bacterial species which do not seem to play any part in the ripening of the cheese.

The author concludes that the Russian-Swiss cheese, in its bacterial flora, closely resembles the genuine Swiss cheese, and that the differences observed between them are due to race variations of the same bacterial species.

The author proposes next to examine the Russian-Swiss cheese for the presence of bacteria causing propionic-acid fermentation which has recently been shown to play an important part in the ripening of Emmental cheese.

The "Friwi" system of butter making, WEIGMANN (*Landw. Wchnbl. Schles. Holst., 59 (1909), No. 45, pp. 759–762; Milch Ztg., 38 (1909), No. 44, pp. 517–519; N. Y. Produce Rev. and Amer. Cream., 29 (1909), No. 4, p. 140*).—This is a report of a test of what was claimed to be a new method discovered by a dairy firm in Hamburg. The essential feature of the process was chilling the cream to between 38 and 41° F. and a double ripening of 1 to 2 days. The claim of an increased yield of butter as well as a percentage of lecithin was not substantiated.

A manual of the working methods and standards for the use of the Medical Milk Commission (*Amer. Assoc. Med. Milk Coms., 1909, pp. 24*).—This contains the methods of inspecting dairy herds and making bacteriological examinations of, and the regulations for dairy employees recommended by the American Association of Medical Milk Commissions.

VETERINARY MEDICINE.

An introduction to the study of the comparative anatomy of animals, G. C. BOURNE (*London, 1909, vol. 1, 2. ed., rev., pp. XVI+299; rev. in Nature [London], 81 (1909), No. 2087, p. 513*).—A second and revised edition, dealing especially with animal biology.

The numbers, proportions, and characters of the red and white blood corpuscles in certain animals, A. GOODALL (*Jour. Path. and Bact., 14 (1909), No. 2, pp. 195–199*).—The information here presented is based on the author's observations and data from various other sources.

The blood counts in laboratory animals may vary considerably, due to different causes. Differences are sometimes due to individual peculiarity or to differences in age, feeding, or environment, while anemia and parsitic conditions are common and may modify the blood.

A bibliography of 27 titles is appended to the account.

Studies on immunity, R. MUIR (*London, 1909, pp. XI+216, figs. 2; rev. in Nature [London], 81 (1909), No. 2077, p. 214*).—Eleven papers by the author in collaboration with C. H. Browning, A. R. Ferguson, and W. B. M. Martin are here brought together. Practically all the work has been previously published in scientific journals.

The present status of the theories of immunity, E. METCHNIKOFF (*Bul. Inst. Pasteur, 7 (1909), Nos. 13, pp. 545–557; 14, pp. 593–604*).—An address made at the Nobel Conference at Stockholm in May, 1909.

General ideas on antibodies: Agglutinins, precipitins, and hemolysins, L. PANISSET (*Rev. Gén. Méd. Vét., 14 (1909), No. 157, pp. 1–12; abs. in Vet. Jour., 65 (1909), No. 413, pp. 575–579*).—This article explains essential points without going into the details or discussing the actual mechanism of the phenomena.

Serums and viruses (*Jour. Amer. Med. Assoc., 54 (1910), No. 4, pp. 285–290*).—This is a symposium on serums, vaccines, tuberculins, etc., which was presented at the meeting of the American Medical Association held at Atlantic City in 1909.

Preliminary report of investigations of serums and vaccines for streptococcus, staphylococcus, and pneumococcus infections, L. HEKTOEN, G. H. WEAVER, and R. TUNNICLIFF (*Jour. Amer. Med. Assoc., 54 (1910), No. 4, p. 257*).—"The antigenic properties of the so-called vaccines were tested by injections in rabbits with subsequent opsonin determinations. Distinct antigenic properties were possessed by all the streptococcus and staphylococcus vaccines tested. The pneumococcus vaccines were inert when injected into rabbits so far as indicated by any change in the opsonic index.

"Streptococcus opsonins could not be demonstrated in any of the serums tested, and activation by fresh serums was not accomplished to any significant degree. When they were injected into rabbits, increase in streptococcus opsonins could not be demonstrated in the serums of the animals in any notable degree, except in some instances.

"Attempts to obtain protective and curative effects from the injection of antistreptococcus serums in rabbits, guinea pigs, and in a more limited scale in mice met failure. The serums often seemed to reduce the natural resistance and to hasten death.

"In the antipneumococcus serums it was impossible to demonstrate antibodies for pneumococci by any method employed.

"It is our belief that the claims for the usefulness of antistreptococcus and antipneumococcus serums rest on impressions from results in clinical cases in man, and have in most cases no foundation whatsoever in experimental tests."

Extracts from state veterinary surgeon's report of 1908, P. O. KOTO (*Iowa Yearbook Agr., 9 (1908), pp. 360–388, figs. 9*).—This extract from the sixth biennial report is devoted largely to a discussion of the status of tuberculosis (pp. 362–381) in the State, the most important work of the department having centered about its location and eradication among cattle.

"The number of cattle tested by our department at the various institutions was 796 head, of which 267 reacted to the test, being a fraction under 34 per cent. There were also 15 head suspicious, which, added to the 267 reacting, makes a total of 282 head. . . . All animals reacting to the test showed tubercular lesions, and some of the suspicious animals were found diseased, a great many in an advanced stage."

Glanders, hog cholera, and maladie du coit are also briefly considered.

Report on the operations of the veterinary sanitary service of Paris and the Department of the Seine for the year 1908, H. MARTEL (*Rap. Opér. Serv. Vét. Sanit. Paris et Dept. Seine, 1908, pp. 292, figs. 7*).—This report takes up the work with contagious diseases (pp. 7–85), meat inspection (pp. 86–232), milk inspection (pp. 233–242), inspection of several classes of establishments including abattoirs, dairies, etc. (pp. 245–249), laboratory investigations (pp. 251–274), and the automobile service (pp. 275–284). Detailed accounts are given of the occurrence of rabies, aphthous fever, tuberculosis, glanders, and swine plague.

A report of the proceedings of the tropical section of the International Veterinary Congress at the Hague, September 13 to 19, 1909 (*Jour. Trop. Med. and Hyg. [London], 12 (1909), No. 19, pp. 292–296*).—In this brief report an abstract is given of a paper by E. Dschunkowsky and J. Luhs, of Surnabad, Russia, on 'The Protozoan Diseases of Domestic Animals in Transcaucasia,' in which a list is given of the ticks observed and an account of researches on spirillosis of geese. In a paper by A. Théiler, Pretoria, Transvaal, on The Prophylaxis of Tropical and Subtropical Diseases in Domestic Stock, the subject is considered under (1) the diseases transmitted by winged insects, and (2) the diseases transmitted by ticks. A brief account is given of a discussion of, and the instruction and laboratories for research in, tropical diseases.

A further report on trypanosomiasis of domestic stock in northern Rhodesia (northeastern Rhodesia), R. E. MONTGOMERY and A. KINGHORN (*Ann. Trop. Med. and Par., 3 (1909), No. 2, pp. 311–374, pls. 2, map 1*).—In continuation of investigations previously noted (E. S. R., 20, p. 1081), the authors here report upon the distribution of stock, the occurrence of biting flies, the disease in stock, prophylactic measures, trypanosomes encountered in naturally infected ruminants and dogs, and examinations made of 20 species of game.

Trypanosoma theileri and related trypanosomes found in cattle, M. MAYER (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 6 (1909), No. 1, pp. 46–51, pl. 1; abs. in Sleeping Sickness Bur.* [*London*], *Bul. 7, pp. 279–280*).—The trypanosomes reported to have been found in bovines are here considered.

The cultivation of trypanosomes on artificial media (*Sleeping Sickness Bur.* [*London*], *Buls. 8, pp. 287–294; 9, pp. 325, 326*).—A review of the literature on this subject.

The rôle of insects in trypanosome infection (*Sleeping Sickness Bur.* [*London*], *Bul. 8, pp. 296–298*).—The following explanation of Kleine's results is considered possible: "The trypanosomes taken up by the fly seem to disappear in a few days, but in reality a few survive, the virulence being lost; these gradually adapt themselves to their new environment, and by the twentieth day have multiplied and regained their virulence which they then retain for an indefinite period."

The mechanism of infection in tick fever and on the hereditary transmission of Spirochæta duttoni in the tick, W. B. LEISHMAN (*Lancet* [*London*], *1910, I, No. 1, pp. 11–14*).—An address delivered before the Society of Tropical Medicine and Hygiene, December, 1909.

Tuberculosis in animals and its relation to man (*Trans. 6. Internat. Cong. Tuberculosis, 4 (1908), pt. 2, pp. 501–1017, pls. 9, charts 2*).—The proceedings of Section 7 of the Sixth International Congress on Tuberculosis, held at Washington, D. C., in 1908 (E. S. R., 20, p. 198) are here reported. Many of the papers are followed by abstracts in 1 or 2 languages other than that in which they were presented.

At the two sessions held on September 29, papers relating to the prevalence and economics of tuberculosis in animals were presented. The Economic Importance of Tuberculosis of Food-producing Animals (pp. 501–511), by A. D. Melvin of this Department, has previously been noted from another source (E. S. R., 21, p. 282). O. E. Dyson presented a paper on Economics as a Positive Factor in the Dissemination of Tuberculosis in Animals (pp. 512–518). In A Study of the Tuberculous Contamination of the New York City Milk Supply (pp. 523–530), by A. F. Hess, it was found that of 107 specimens of raw milk tested, 17 contained tubercle bacilli. Bovine Tuberculosis in Louisiana and Some Other Southern States was considered by W. H. Dalrymple (pp. 533–542), who stated that while the disease is prevalent and possibly on the increase among the dairy cattle of the Southern States, the native or "scrub" animals are singularly free from it, possibly because of their out-of-door nomadic existence, lesser exposure, and greater natural resistance. Dissemination of Tuberculosis Among Animals in Alabama was the subject of a paper by C. A. Cary (pp. 544–546), in which it was pointed out that the wide ranges and outdoor life of these cattle tends to eliminate the transmission of the infection by moist infected nasal discharges or by infected fecal materials, so that scrub and beef cattle are rarely infected by tuberculosis. Moreover, as the beef cattle are not finished in feeding pens on corn they are never followed by hogs, so that hogs are rarely infected by tuberculosis. L. A. Klein reported upon the Control of Tuberculosis in Domestic Animals in Pennsylvania (pp. 547–556), as

previously noted (E. S. R., 21, p. 583). In discussing Bovine Tuberculosis under Range Conditions (pp. 557, 558), M. E. Knowles, of Montana, stated that while constantly on the outlook for the disease during the past 16 years, he had been unable to find a single animal showing, under strict range conditions, clinical evidence of tuberculosis. Tuberculosis in Range Cattle in California was the subject discussed by G. S. Baker (pp. 561–563). Some of the information given by A. R. Ward and C. M. Haring in a paper on The Prevalence of Tuberculosis Among Dairy Cattle in the Vicinity of San Francisco, Cal. (pp. 564–567), has been recorded in an article previously noted (E. S. R., 20, p. 681). A paper on Tuberculosis of Cattle from the Point of View of the Farmer, presented by J. E. Pope (pp. 571–581), was discussed by Drs. Reynolds, Turner, and Bang.

At the third session, held on September 30, papers relating to the pathology and bacteriology of tuberculosis in animals were presented. W. R. Blair, of the New York Zoological Park, read a paper on Tuberculosis in Wild Animals in Captivity (pp. 584–587). This report was devoted particularly to animals in the primates collection, as animals at that park outside of the monkey collection are said to be remarkably free from the disease. Observations Upon Monkeys of the Philadelphia Zoological Garden After Injection of Koch's Old Tuberculin, by C. Y. White and H. Fox (pp. 591–598), show that tuberculosis is a disease which causes a considerable mortality in monkeys and that their habits facilitate the transmission when many are together on exhibition. "The normal temperature of the monkey is higher than that of the human being by 4 to 5° F. at its highest point. It follows a regular curve during the 24 hours, with the high point at 3 p. m., in the neighborhood of 101 to 102°, its lowest level, about 99°, at 3 a. m. . . . An injection of tuberculin into an infected monkey will cause a definite rise in temperature, a destruction of the daily curve, the performance of a course higher than the daily temperature at the previous high point or any or all of these. By the test we have been able to detect tuberculosis in 47, or 37 per cent, out of 128 monkeys tested." A paper on The Occurrence and Significance of Tubercle Bacilli in the Feces of Tuberculous Cattle was presented by E. C. Schroeder (pp. 599–606), who stated that when first examined 5 of 12 apparently healthy cattle, known to be tuberculous only because they had reacted to tuberculin intermittently, passed acid-fast bacilli per rectum with their feces and that 18 months later the number was increased to 10. A discussion followed. In discussing Porcine Tuberculosis (pp. 613–619), S. Stewart and A. T. Kinsley stated that "infection evidently takes place through the mucous membrane of the alimentary tract, and in a large percentage of cases the invasion is through the mucous membrane of the mouth and pharynx, the gross lesions being confined to the related lymphatics, the submaxillary parotid, or superior cervical glands. The invasion may occur through the intestinal mucous membrane only or simultaneously through both portions of the canal, and through either channel of entrance be carried to any part of the animal." Patho-histological studies were made of 257 hogs, a summary of the conditions observed in 770 microscopical sections being reported. A Review of Recent Investigations on Tuberculosis Conducted by the United States Bureau of Animal Industry was given by J. R. Mohler and H. J. Washburn (pp. 620–640), a bibliography of 39 titles being appended to this account.

At a joint session of Sections 1 and 7, held on September 30, the relation between tuberculosis of animals and of man was discussed. Dr. Robert Koch opened the session with a discussion previously noted (E. S. R., 20, p. 1185) of The Relation of Human and Bovine Tuberculosis (pp. 645–650). Dr. Theobald Smith spoke at length upon The Relation Between Human and Animal Tuberculosis, With Special Reference to the Question of the Transformation of

Human and Other Types of the Tubercle Bacillus (pp. 651–660). He concluded that the time has not yet come to state positively that one type can or can not be transformed into the other, but that until such a time arrives we may safely take the ground that any regular or wholesale conversion of bovine into human bacilli in the human body is out of the question, as contradicted by most of the experimental evidence thus far presented and by certain observations made on the occurrence of the spontaneous disease. Other addresses relating to the relations between tuberculosis in animals and man were: The Relations of Human and Bovine Tuberculosis, by G. S. Woodhead (pp. 661–665); On the Relations of Bovine Tuberculosis to Human Tuberculosis, by S. Arloing (pp. 666–671); Investigations of the Relations of Human and Bovine Tuberculosis and the Tubercle Bacilli, by J. Fibiger and C. O. Jensen (pp. 672–681); Relations of Human and Bovine Tuberculosis, by M. P. Ravenel; The Susceptibility of Cattle to the Virus of Surgical Forms of Human Tuberculosis, by R. R. Dinwiddie (pp. 686–691); Tuberculous Cervical Adenitis: A Study of the Tubercle Bacilli Cultivated from Fifteen Consecutive Cases, by P. A. Lewis (pp. 692–696); The Types of Tubercle Bacilli Present in Eighty-four Cases of Human Tuberculosis in New York City, by W. H. Parks (pp. 697–703); Studies in Atypical Forms of Tubercle Bacilli Isolated Directly from the Human Tissues in Cases of Primary Cervical Adenitis, with Special Reference to the Theobald Smith Glycerin-bouillon Reaction, by C. W. Duval (pp. 704–729); Bovine Tuberculosis in Cuba: A Comparative Study of Bacilli of Human and Bovine Origin, by J. N. Davalos and J. T. Cartaya (pp. 730–734); and The Intertransmissibility of Tuberculosis, by C. F. Dawson (pp. 735–740).

At a conference on the relations of tuberculosis of animals and of man, held on October 1, in continuation of the joint sessions of Sections 1 and 7, there was a general discussion (pp. 741–756).

At the session on October 1, papers were presented relating to the diagnosis of tuberculosis in animals. A. W. Bitting discussed The Infection of Swine from Tuberculous Cattle (pp. 757, 758); A. T. Peters, Tuberculous Hogs an Indication of Tuberculous Cattle (pp. 759–764); and G. B. Jobson, The Tuberculin Test an Efficient Agent for the Detection of Bovine Tuberculosis (pp. 765–770). S. B. Nelson presented A Report of the Results of the Continued Injections of Tuberculin upon Tubercular Cattle (pp. 773–782), in which he concluded that "the injection into tubercular cattle of large monthly or small weekly doses of tuberculin does not have therapeutic value. The injection of constantly increased daily or weekly doses of tuberculin does have therapeutic value. The evening temperature is usually higher than the morning temperature in tubercular cows. The oftener tuberculin injections are made into tubercular cattle, the sooner the temperature reaction begins and the sooner the zenith is reached." In the Report of a Commission on the Ophthalmo Reaction, presented in the name of the Société de Pathologie Comparée, by Bailliart (pp. 785–800), the following conclusions were drawn: "The ophthalmo reaction is a diagnostic procedure which is usually without danger if it is applied only to eyes free from tuberculous lesions of any kind. It is sometimes followed by mild and transitory accidents. The reaction is not always proportionate to the gravity of the lesions. Quite often it is even absent during the last stages of tuberculosis. . . . Very often the reaction is doubtful. In cattle, owing to the difficulties of examination, doubtful cases must be regarded as negative. . . . A simple (primary) ophthalmo reaction is a very unreliable procedure, and can not take the place of inoculation with tuberculin. A secondary ophthalmo reaction gives very much more trustworthy results. . . . A tuberculous animal only exceptionally fails to react to this second ophthalmo reaction. It is more frequent to see a positive ocular reaction in a nontuberculous animal. Combined ophthalmo reaction, while

incapable of displacing subcutaneous injection of tuberculin as a diagnostic procedure, is nevertheless a convenient and infinitely more simple measure, capable of rendering real services to certain cases." D. S. White and E. McCampbell presented a paper previously noted (E. S. R., 20, p. 284) upon the Ophthalmo-tuberculin Test in Cattle (pp. 804–810). A New Method of Producing in a Tuberculous Human Being, the Cutaneous Tuberculin Reaction, previously noted (E. S. R., 22, p. 86) was described by J. Lignieres (pp. 814–817). In discussing The Intradermal Reaction to Tuberculin in Animals (pp. 821–835), G. Moussu and C. Mantoux stated that this local reaction does not usually cause any general disturbance, little or no fever, no loss of appetite, and little or no loss of milk. "It develops without any change in the ordinary conditions of the life of the animals and without its being necessary to take any measures or special precautions. . . . It reduces the obligations of the operator to a minimum, by dispensing with every preparatory or supplementary measure (taking of temperature, denudation of the skin, etc.). It is applicable to every kind of domestic animal." Eartagging Marketed Live Stock as a Means of Automatically Locating Dangerous Tuberculous Animals Which Contaminate Milk and Economizing their Eradication (pp. 837–848), was a subject of a paper by B. Rogers, in part previously noted (E. S. R., 20, p. 186).

The sessions of October 2, at which the control of tuberculosis in animals was the subject under discussion was opened by Dr. Bernard Bang, who described (pp. 850–868) Measures Against Animal Tuberculosis in Denmark (E. S. R., 20, p. 791). Other papers presented at this session were The Control of Bovine Tuberculosis, by J. G. Rutherford (pp. 869–878) previously noted (E. S. R., 21, p. 385); History of the Agitation Against Bovine Tuberculosis in Massachusetts, Resulting Legislation, and Lessons to be Derived from the Attempts of the State Toward its Eradication and Control, by A. Peters (pp. 884–901); The Use of Tuberculin in Controlling Tuberculosis in Herds, by C. J. Marshall (pp. 903–908); Bovine Tuberculosis in Maine for Twenty Years, by J. M. Deering (pp. 909–917); The Value of Tuberculin in the Control of Tuberculous Herds, by V. A. Moore (pp. 918–923); and The Problem of Bovine Tuberculosis Control, by M. H. Reynolds (pp. 927–950) previously noted (E. S. R., 21, p. 179).

At the closing session, held on October 3, the discussion of the control of tuberculosis in animals was continued. D. A. Hughes, who spoke on the Precautionary Sanitary Legislation Against Tuberculosis of the Domesticated Animals in the United States (pp. 952–980), was followed by J. B. Piot, on the subject Economic Survival of Cattle which Have Reacted to Tuberculin (pp. 984–986); O. G. Noack, on the Meat and Dairy Herd Inspection as Preventive Measures Against the Spread of Tuberculosis Among Cattle (pp. 987–994); J. F. Heymans, on Vaccination Against Tuberculosis in Cattle (pp. 997–1001); and L. Pearson, of Pennsylvania, on The Vaccination of Cattle Against Tuberculosis (pp. 1002–1003). The session closed with a general discussion.

Studies on tuberculosis in domestic animals, and what we may learn from them regarding human tuberculosis, B. BANG (*Trans. 6. Internat. Cong. Tuberculosis, 1908, Sup. (Spec. Vol.), pp. 207–220*).—This is a special lecture delivered before the International Congress on Tuberculosis at Washington, D. C., October 3, 1908.

The relative importance in New York City of the human and bovine types of tubercle bacilli in human tuberculosis at different periods of life, W. H. PARK and C. KRUMWIEDE (*Trans. Assoc. Amer. Physicians, 24 (1909), pp. 135–138*).—Of 28 fatal cases investigated in young children, 22 were due to the human type and 6 to the bovine type of the tubercle bacillus. Neither in age, clinical symptoms, nor pathological findings was any distinctive differences noticed which could be referred to the type of tubercle bacilli producing the

infection. In 200 adults given the usual tests all were found to be due to the human type. It thus appears that while bovine infection is a considerable factor in tuberculosis of young children, in adults it is extremely rare.

Tuberculosis in dairy cows, with special reference to the udder and the tuberculin test, A. Wilson (*Witham, 1908, pp. 1–44*).—This account has been previously noted from another source (E. S. R., 20, p. 283).

The influence of the ingestion of dead tubercle bacilli upon infection, M. J. Rosenau and J. F. Anderson (*Trans. Assoc. Amer. Physicians, 24 (1909), pp. 139–145*).—In order to determine whether the susceptibility to tuberculosis is increased, decreased, or unchanged by the previous eating of food containing tubercle bacilli killed by heat, 50 guinea pigs were fed for 60 days on tubercle bacilli which had been heated to 60° C. for 30 minutes and were then given one feeding of 43-days-old live tubercle bacilli in butter. Fifty pigs used as checks were kept under the same conditions but fed only the live tubercle bacilli. The feeding of dead tubercle bacilli to guinea pigs did not appear to alter the susceptibility or have any evident effect upon the subsequent course of the disease.

Researches on the pathological histology of atypical actinomycosis, I. Choukévitch (*Arch. Sci. Biol. [St. Petersb.], 14 (1909), No. 4, pp. 311–347*).—A contribution from the laboratory of the Imperial Institute of Experimental Medicine at Cronstadt.

The period of emission of bacteria in acute parenchymatous mammitis and the influence of milking on the progress of the inflammation, Fauss (*Monatsh. Prakt. Tierheilk., 20 (1909), No. 9–10, pp. 457–471; abs. in Rev. Gén. Lait, 7 (1909), No. 17, pp. 404, 405*).—The author finds that in acute parenchymatous mammitis caused by organisms of the coli group the period of emission of bacteria is from 12 to 30 days, the number of bacteria and the period of their emission being directly proportional to the degree of the inflammation. In mammitis caused by organisms of the *Bacillus enteritidis* group, the emission of bacilli continues in acute cases for about 30 days. By frequent milking the hyperemia is decidedly increased, inducing a secretion of antibodies favorable to recovery. Unless milked the gland atrophies as a result of the inflammation, whereas by a frequent milking of the inflamed gland the natural secretion is induced and maintained. In acute mammitis the extension of the inflammation from one quarter to another does not take place.

Experimental investigations of bacillary pseudotuberculosis of sheep and the possibility of its transmission to other animals, O. C. Noack (*Experimentelle Untersuchungen betreffend die bazilläre Pseudotuberkulose der Schafe und deren Übertragungsfähigkeit auf andere Tiergattungen. Inaug. Diss., Univ. Bern, 1908, pp. 84, pls. 6; rev. in Bul. Inst. Pasteur, 7 (1909), No. 8, p. 365*).—Following a brief introduction the author reviews the literature relating to this affection (pp. 6–14), references to 42 titles being given.

Under the heading of investigations, the symptoms, anatamo-histo-pathological and bacteriological studies, transmission investigations, and the resistance of the organism are considered (pp. 15–70). Animals upon which transmission experiments were conducted include the guinea pig, rabbit, mouse, rat, sparrow, pigeon, fowl, cat, dog, pig, sheep, goat, and horse. The bacillus is polymorphus, its virulence varying with the form. The highly virulent short forms are found in young cultures and in soft caseous pus, the mildly virulent long forms in old cultures and in firm caseous or calcified nodules. Infection takes place in sheep through the inhalation and ingestion of the organism and through lesions of the skin. The bacillus is highly resistant to cold, moderately resistant to chemical agents, and readily destroyed by heat. Continued drying merely weakens its virulence. The author was unable to confirm the statements

of Nocard and Leclainche relative to the identity of the bacillus as the exciting cause of ulcerative lymphadenitis and contagious acne of horses.

Convulsions in young pigs due to verminous infestation, Bru (*Rev. Vét. [Toulouse], 34 (1909), No. 4, pp. 212–217; abs. in Jour. Compar. Path. and Ther., 22 (1909), No. 2, pp. 158–160*).—During the winters of 1906–7 and 1907–8, between December and March, this condition assumed an enzootic form and occurred with great frequency in the author's neighborhood. His cases were distributed over 90 different farms. Post-mortem examinations revealed the presence of ascarids in considerable numbers, and of lesions in the digestive tract. Parasites were distributed throughout the intestine from the esophagus to the rectum, and had produced signs of intestinal obstruction, of enteritis, and, in cases where the intestinal wall had been perforated, even of peritonitis. In several cases the lumen of the digestive tube was entirely obstructed by masses of ascarids, in one case nearly a quart of parasites being found. Anthelmintic treatment followed by purgatives gave the best results.

The present status of our knowledge of the causative agent of epizootic lymphangitis of equines, B. Galli-Valerio (*Centbl. Bakt. [etc.], 1. Abt., Ref., 44 (1909), No. 19, pp. 577–582, fig. 1*).—The author finds that this disease is probably due to the protozoan described by Rivolta as *Cryptococcus farciminosus*. The affinities of the organism seem to warrant its reference to the genus Leishmania.

Three years of rabies in Indiana, J. P. Simonds (*Mo. Bul. Ind. Bd. Health, 12 (1909), No. 11, pp. 155–157*).—An epidemic of rabies of no small proportion is stated to have existed in Indiana for the past 3 years. It seemed to have reached its height in the summer of 1909 and now appears to be abating somewhat, although the danger period is far from being past.

Since December, 1906, the brains of 240 animals have been examined, of which 145, or 60 per cent, were found to contain Negri bodies.

Investigations of the spirochetosis of fowls of Tunis and of the active agent in its transmission, Argas persicus, B. Galli-Valerio (*Centbl. Bakt. [etc.], 1. Abt., Orig., 50 (1909), No. 2, pp. 189–202, figs. 8; abs. in Jour. Trop. Vet. Sci., 4 (1909), No. 4, pp. 599, 600*).—During the course of the investigations the author found that a fowl bitten by argasids which had been kept for 5 months in the laboratory was not infected. Larvæ from eggs of a tick which had been used in the transmission of the disease did not prove to be infective. *Spirochæta anserina*, *S. marchouxi*, and *S. gallinarum* are thought to be identical, *anserinum* holding through priority. The following method is used in the preservation of ticks in collections: First immerse for 24 hours in creosote 2 grains, nitrate of potash 10 grains, glycerin 200 grains, and water 800 grains, and then pass into paraffin oil.

Further observations on fowl spirochetosis, A. Balfour (*Jour. Trop. Med. and Hyg. [London], 12 (1909), No. 19, pp. 285–289*).—This is a record of new developments of which some of the more important observations are tabulated and illustrative cases described.

"It has been found that lice (*Menopon* sp. ?) can, in all probability transmit the disease from the sick to the healthy chick. . . . In chicks relapses are common. . . . The results of inoculations in the case of chicks have differed from those obtained in fowls. . . . Ticks (*Argas persicus*), either as larvæ, nymphs, or adults, fed on chicks with acute spirochetosis exhibit the peculiar chromatin granules first described by Leishman in the case of *Ornithodoros moubata* fed on blood containing *Spirochæta duttoni*. . . . Chicks, inoculated with an emulsion of crushed larvæ, showing these granules, but no spirochetes, develop acute spirochetosis. . . . Pigeons are apparently not inoculable with this form of spirochetosis."

Notes on the parasitism of Cytodites nudus and Hæmaphysalis chordeilis, P. B. HADLEY (*Science, n. ser., 30 (1909), No. 774, pp. 605, 606.*).—The author describes the conditions of infection as observed in 2 cases of acariasis, caused by *Cytodites nudus*, occurring in the yards of the Rhode Island Station. In the first case, that of a female golden pheasant, mites were found to have perforated both the pericardium and the wall of the gall bladder. The second case of infection was that of a fowl received from a poultry yard near the station.

A tick (*Hæmaphysalis chordeilis*) is reported to have occurred on young turkeys at Norwich, Vt., June, 1909, in such numbers as to kill 40 of a flock of 46. The ticks were first observed in the latter part of May when the turkeys were about a week old. The parasite was found largely in the region of the neck, most of the birds that were infested carrying from 70 to 80 full-grown ticks as well as many more immature forms.

Naphtha soap as a disinfectant, S. K. DZERZGOWSKI and V. L. STÉPANOVA (*Arch. Sci. Biol. [St. Petersb.], 14 (1909), No. 4, pp. 283–303*).—A contribution from the Imperial Institute of Experimental Medicine at Cronstadt, in which the chemical and physical properties of naphtha soap are considered.

Meat inspection in Hungary, A. LÁSZLÓ (*Vet. Jour., 65 (1909), No. 413, pp. 553–558*).—An account of the methods followed in the inspection of meat in Hungary.

RURAL ECONOMICS.

Concerning the actual significance of the law of diminishing returns in agriculture, O. AUHAGEN (*Landw. Jahrb., 38 (1909), Ergänzungsb. 5, pp. 491–530*).—This paper critically examines the law of diminishing returns and maintains that it has no scientific value from the standpoint of agriculture.

According to the author, the development of agricultural technique has resulted in increased production of the means of subsistence to such an extent that not only is the totality of production greater, but the proportionate share falling to the individual is greater notwithstanding the enormous increase in population since the law was formulated. At the same time a limit is reached in agricultural practice when a further expenditure of capital and labor will be fruitless. The author points out these limits as regards the operation of natural forces as well as those under which plants grow to yield the best returns. The depth of plowing, the amount of plant food and moisture in soils, temperature, sunshine, the minimum of room for plant growth, the time necessary for plant development, and many other factors determine the maximum yield.

The stimulus to agricultural production was in a certain sense the increase of population itself. This necessarily forced mankind to further progress which resulted in the development of the technique of agriculture. "It is an error to deduce as a law from the increase of population and the corresponding increase of the means of subsistence the relative decrease of land productivity and to set down technical progress only as an incidental or even as an exceptional check or breach of the law. Progress in land productivity yields itself also as an economic law resulting from the increase of population."

At the same time the author recognizes a limit to man's ability to make the earth yield her increase of products, chiefly because in agriculture even the scientific farmer is dependent to a considerable extent upon the forces of nature, and so maintains that man will be able to reach his highest stage of development only as he learns to control completely the forces of nature.

Therefore progress will be accelerated by the live problems of to-day which acting as a matter of necessity will urge mankind forward to find ways of increasing the means of subsistence. While the so-called law of diminishing returns possesses no actual value it still has a potential value in that if population should increase too rapidly the relative productivity of land must necessarily decrease, and to this extent the Malthusian theory is correct.

What is true of agriculture is likewise true in general in the industries for they in the last analysis are dependent upon land productivity for their supplies of raw materials. This serves as a check upon the productivity of capital and labor in modern industry, but the checks in agriculture are stronger, more direct, and more embracing, for the reason that the extension of cultivation and improvement in methods can be exercised in individual cases only within relatively narrow limits. "The difference between agriculture and industry is not to be understood as indicating that in the former man works with relatively decreasing returns and in the latter with relatively increasing returns. For in agriculture the rewards of labor can be increased, but in general not so rapidly as in the industries."

The author, in critically examining the views of various economists, presents an extensive bibliography on the law of diminishing returns in agriculture.

The economic returns for 21 years from a peasant farm in Kurhessen, H. L. Rudloff (*Fühling's Landw. Ztg., 58 (1909), No. 21, pp. 781–786*).—This farm was about 77 acres in size and situated on the hill lands of the province of Hesse. The soil was stony and not very fertile, the climate severe, and the market conditions unfavorable. It is characteristic of most of the middle and large-size farms in the district, both as regards physical conditions and profitableness.

The farm is operated by the owner, his wife, one son, and two daughters, and five additional children are supported out of the income from the farm. The standard of living of the family is described and compares favorably with any working-class family.

Under these conditions the returns show a net income over all expenses of operating the farm and maintaining and educating the family for the 21 years of 5,481 marks (about $1,300), or an average yearly surplus income of 261 marks. Four of the years show a deficit ranging from 10 to 486 marks. The largest source of income, 54.50 per cent, was from the sale of live stock and their products. The author believes that the economic welfare of farmers in this district lies in the raising of live stock rather than in the production of cereals or other cultivated products, and in owning rather than in renting farms.

Some considerations concerning the significance of erecting small dwellings on farms, L. Noack (*Landw. Jahrb., 38 (1909), Ergänzungsb. 5, pp. 217–228, figs. 2*).—This article discusses the need of erecting better dwellings on farms for the accommodation of farm laborers. A model of a house to accommodate two farm laborers' families is described and illustrated, including data on the cost of construction. The erection of sanitary and commodious dwelling houses for farm help is advocated on the ground of making the laborers more contented. This would tend to retain them on the land and incidentally be instrumental in helping to solve the agricultural labor problem.

Small holders: What they must do to succeed, E. A. Pratt (*London, 1908, pp. VII+247*).—This book discusses the economic disadvantages under which small holders labor in England and the different lines of the agricultural industry for which these holdings are adapted, and emphasizes the importance of cooperation among small holders in the purchasing of their supplies, the marketing of their products, the insurance of their stock and premises, and the

furnishing of credit in order to place them on an equal footing with their foreign competitors whose products are sold more cheaply on English markets at the present time.

In a chapter on "the revival of country life" the work of the Country Life Commission in the United States is reviewed in detail, and the conclusion is drawn that to effect a revival of rural life in most countries there must be (1) an "increased efficiency in both the production and the sale of agricultural commodities, so that better financial prospects may be assured to the cultivator; and (2) accompanying these material improvements there should be a betterment of the social and intellectual conditions of rural life."

Agricultural small holdings in France (*La Petite Propriété Rurale en France. Paris: Govt., 1909, pp. XV+348, pls. 18; rev. in Jour. Agr. Prat., n. ser., 18 (1909), No. 42, p. 538*).—To the part of the data contained in this volume which has been previously noted from another source (E. S. R., 21, p. 688), a series of appendixes has been added which deal with the evolution, valuation, ownership, and operation of small holdings during the past 20 years, together with a comparison of the profitableness of small holdings and large holdings.

[Agricultural holdings in Belgium] (*Statis. Belg. Recense. Agr., 1907, Partie Analyt., pp. 49–54*).—The number and size of the various agricultural holdings in Belgium for the years 1906 and 1907 are reported. The number of holdings for the two years were 297,768 and 299,084, respectively, more than 90,000 of which ranged from 1 to 2 hectares in size. Only 551 holdings exceed 100 hectares in extent.

Agricultural associations in Belgium, M. TURMANN (*Les Associations Agricoles en Belgique. Paris, 1909, 2. ed., pp. IX+468*).—This book gives an account of the origin and development of agricultural cooperative societies in Belgium from 1890, the year when they first began to spring up, to 1900, the date of the first edition of the book. Special emphasis is laid on the causes which led to their formation, and the principal types of official associations, professional agricultural unions, societies for the purchase and sale of products, cooperative producing associations, cooperative credit societies, and mutual insurance societies are discussed.

An appendix discusses the status of agricultural associations in Belgium in 1907, with tables giving statistics for that year in detail. An extensive bibliography is included.

Organization among the farmers of the United States, J. L. COULTER (*Yale Rev., 1909, Nov., pp. 273–298; Reprint, pp. 28*).—This is an account of farmers' organizations in the United States from 1785 to date, particular emphasis being laid on the political, economic, and social activities of the various organizations. It is the conviction of the author that, during the past 20 years, political activity by farmers' organizations "has been largely left to the old line political parties, and most effort has been turned to the even more difficult task of establishing all phases of the farmers' own industry on a sound business basis. At the present time agriculture is assuming a more business-like as well as a more scientific character than at any other time in our history."

The reform of the commission business, G. C. STREETER (*Farm and Fireside, 33 (1909), No. 4, p. 5, figs. 2*).—The plan of reform advocated in this article is governmental regulation of the commission business, careful grading and branding of products on the part of farmers, and the appointment of sales inspectors to pass upon the condition of goods in cases of dispute.

Cooperation among farmers, orchardists, and truck growers is believed to be the most practical method of solving the problem of grading and branding the various farm products, and examples of the successful operation of such organizations are cited; while governmental regulation of the commission

business is urged on the basis of economics and business and because it is "the paramount and important matter now before the country people. When the farmers, orchardists, and truck workers of this country rise and protest against present conditions and demand that their interests be properly safeguarded, the commission business will be put on such a sound and honest basis that it will return to the farmer a just and adequate return for the product that he creates."

Adaptability of the South to the needs of homeseekers in foreign lands, D. A. WILLEY (*Tradesman, 62 (1909), No. 22, p. 35*).—The outlines of a plan for the establishment of a colony of Hollanders on a 1,000-acre farm in North Carolina are reported. The scheme aims to make each farmer his own landlord and to give him satisfactory returns for his labor through the cooperative marketing and distribution of his products.

A new St. Helena, F. FERRERO (*Survey, 23 (1909), No. 6, pp. 171–180, figs. 8*).—This article outlines the history of an Italian colonization scheme carried out during the past 4 years on the swamp lands north of Wilmington, N. C., where early agricultural products are grown and shipped to the New York markets. The principles of cooperation are practiced to some extent in the colony for the purchase of supplies, and the plan of this settlement is commended as a means of solving the problems of the overcrowding of unskilled workers in cities and the lack of farm labor in rural districts.

An agricultural survey of Nebraska, J. E. WARREN (*Ann. Rpt. Nebr. Bd. Agr., 1909, pp. 271–351, charts 24*).—This is a compilation of information and summary of observations relating to climate, run-off and evaporation, geology, topography, altitude and slope, drainage, irrigation, wells, soils, crops, live stock, forestry products and building materials, transportation and markets, population, land tenure, values, and returns, and farm management.

A bibliography of literature relating to the subject is appended.

[Agriculture and colonization in Canada], P. H. MCKENZIE ET AL. (*Rpt. Select Standing Com. Agr. and Colon. [Canada], 1907–8, pp. XIII+412*).—This is a detailed report by a committee of 135 members on matters pertaining to the agricultural possibilities of Eastern Canada and the areas available for colonization by agriculturists in the great west and northwest provinces and territories, including an appendix on the immigration of agriculturists into Canada for a number of years. The returns show no less than 235,328 arrivals for 9 months of 1907–8, as compared with 124,667 for the corresponding 9 months of 1906–7.

Agricultural statistics of Ireland, with detailed report for the year 1908, W. G. S. ADAMS (*Dept. Agr. and Tech. Instr. Ireland, Agr. Statis. 1908, pp. XXXV+153*).—Statistical data of crop areas and production, live stock, bee keeping, forestry, and holdings and occupiers during 1908 are reported. The holdings numbered 601,765 as compared with 599,872 in 1907 (E. S. R., 20, p. 690).

Agriculture in Dahomey, N. SAVARIAU (*L'Agriculture au Dahomey. Paris, 1906, pp. 110, pls. 12, figs. 14, maps 2*).—The climate, topography, economic conditions, and transportation facilities of the country are discussed. Native implements and cultural methods are described, and the principal economic plants and their production for food, fiber, and miscellaneous purposes are taken up. Animal production is treated in a similar manner.

The International Institute of Agriculture, LOUIS-DOP (*Jour. Agr. Prat., n. ser., 18 (1909), Nos. 42, pp. 530–532; 46, pp. 656–661; 48, pp. 722–726; 49, pp. 755–758*).—This is an account by the French delegate of the origin, purposes, organization, and progress of the institute, with particular reference to its economic and international significance. The purposes of the institute are defined

as not only to seek to ameliorate the conditions of agriculture in different countries, but also to meet the dangers arising from the spread of plant and animal diseases as a result of international traffic in agricultural products and to make a comparative study of the economic, social, and financial institutions that exist in various countries for the promotion of the interests of the rural population.

AGRICULTURAL EDUCATION.

The duty of the agricultural college, H. J. Waters (*Science, n. ser., 30 (1909), No. 778, pp. 777–789*).—This is the inaugural address of the president of the Kansas college, in which he deals with the various functions of the agricultural college in relation to students enrolled in its courses, to agricultural extension work, and to research work in agriculture and home economics. He points out the necessity of conserving the natural resources of Kansas and the duty of the agricultural college and experiment station in this work; he favors investigation not only to increase the quantity and quality of agricultural production but also to provide means and encouragement for the manufacture of agricultural products within the State; he advocates the teaching of vocational subjects in the public schools and urges that greater attention be given to training teachers for this work; and finally he directs attention to the need of world leadership among men and women, and the duty of the college in preparing leaders.

Agricultural and forestry instruction and agricultural associations in Italy, Belgium, and France, with notes on some agricultural institutions in Great Britain, Russia, and Bulgaria, I. Giglioli and U. Rossi-Ferrini (*Insegnamento Agrario e Forestale ed Associazioni Agrarie nell'Italia, nel, Belgio, nella Francia con notizie su alcune Istituzioni Agrarie della Gran Bretagna, della Russia, della Bulgaria. Milan, 1909, pp. 141*).—In this report of the jury of the Section on Agricultural and Forestry Instruction and Agricultural Associations of the Exposition in Milan, 1906, descriptions in considerable detail are given of the work of agricultural institutions for education and research in Italy, and in less detail of those in Belgium, France, Great Britain, Russia, and Bulgaria. In the case of Italian institutions the report deals with higher agricultural schools and universities, agricultural and special experiment stations, special and practical agricultural schools, itinerant and military instruction in agriculture, instruction in agriculture in normal and elementary schools and denominational seminaries, agricultural education for women, materials for agricultural instruction, publications, and agricultural associations.

Report of the agricultural department of Finland for 1907 (*Landtbr. Styr. Meddel., 1909, No. 61, pp. VI+229*).—Reports of the work of the various institutions engaged in the administration or teaching of agriculture or allied branches are presented.

Foreign veterinary schools and their plan of instruction, R. Coderque (*Gac. Med. Zool., 33 (1909), Nos. 22, pp. 337–342; 23, pp. 355–359*).—As the result of a visit to the veterinary schools in Paris-Alfort, France; Berlin, Hanover, Stuttgart, and Dresden, Germany; Berne and Zurich, Switzerland; and Milan, Naples, Pisa, and Turin, Italy, the author makes brief observations on veterinary instruction in these countries, with more detailed statements regarding the organization of this instruction in the Berlin and Hanover schools.

Annual of the Winnebago County schools, 1909, O. J. Kern (*Rockford, Ill., 1909, pp. 96, figs. 82, dgm. 1, charts 8*).—In addition to the usual statistics of attendance and rural school improvement, this report presents the following new features: The constitution of a "School Parents' Association," indoor improvement for the rural school, improving the rural school course of study,

a four-year high school course in agriculture (prepared by Dean Davenport), Lincoln's views of agriculture with comments by Prof. C. G. Hopkins, and improvement in the work of boys' and girls' clubs, with a list of the prize-winners in corn-growing and domestic art work.

Practical school gardening, P. ELFORD and S. HEATON (*Oxford, Eng., 1909, pp. 224, pls. 5, charts 3, dgms. 7, figs. 77*).—In this text-book the authors give cultural directions for the different features of garden work, together with chapters on insects and other pests of the garden, friends of the garden, a calendar of gardening operations, and a nature calendar, and appendixes dealing with the school garden and "discovery" lessons or field trips, meteorological observations, and several useful tables.

School gardens in Ceylon, C. DRIEBERG (*Philippine Agr. Rev.* [*English Ed.*], *2 (1909), No. 9, pp. 492, 493*).—A brief statement of the object of school gardens, conditions under which they are worked, and points in the judging of gardens for the information and guidance of Ceylon teachers.

The study of nature, S. C. SCHMUCKER (*Philadelphia and London, 1909, pp. 315, pls. 4, figs. 54*).—This volume is divided into 3 sections. The first deals with the theory of nature study, what it is, its aim, purpose, school-room applications and equipment, suitable subject-matter, and the teacher's preparation. Section II, the materials of nature study, includes the insects, some "water-dwellers," reptiles, birds, wild and domestic animals, plant life, and the heavens. The last section suggests a related course of nature study and includes a list of helpful books. The entire treatment is in the spirit of the author's teaching experience and public addresses on the subject.

Nature study in congested city districts, EMMA SYLVESTER (*Nature-Study Rev., 5 (1909), No. 8, pp. 201–209*).—This paper is designed primarily to suggest improvements in the New York State Syllabus of Nature Study, but its recommendations have general application to conditions in large cities.

Some of the difficulties in such situations are classified as (1) lack of nature-study material, (2) difficulty of securing suitable material at the proper time, (3) lack of time to care properly for material secured, (4) lack of specific teaching directions for the subject, (5) too large classes to permit maximum possible benefit from individual study of material, and (6) lack of proper correlation of nature study with the other subjects of the course.

Among the improvements suggested are (1) first hand study of phenomena everywhere available—as water evaporation, condensation, clouds, erosion, and the effects of frost; (2) a division of the work into required and optional categories, under the first of which should be included the cat, dog, canary, common fruits, vegetables, and flowers; (3) omission of all rare birds, flowers, animals, etc., and all classifications which pupils are not prepared to understand; (4) closer cooperation between the City Park Department and the schools, so that the schools may have the benefit of prunings, cuttings, nests, cocoons, etc.

Boys' agricultural clubs, V. L. ROY (*La. Dept. Ed. Circ. Inform., 1909, Dec., pp. 14*).—This circular briefly reviews the origin of boys' club work in connection with the farmers' institutes in Macoupin Co., Ill., sets forth the purposes and value of such work, and gives several pages of practical directions for organizing clubs, recording the work done, and judging exhibits. It is designed especially for use in the parish divisions of Louisiana.

NOTES

Tuskegee Institute.—Millbank Agricultural Hall, the gift of Mrs. Elizabeth M. Anderson, of New York City, was dedicated February 23. President Seth Low, of the board of trustees, presided at the dedicatory exercises, in which other participants were Robert C. Ogden, of New York City, State Commissioner of Agriculture J. A. Wilkinson, and Vice-President W. W. Campbell, of the board of trustees.

California University and Station.—As the result of an enthusiastic meeting in December of the nature-study section of the State Teachers' Association, at which Professor Babcock of the department of agricultural education was elected president of the California branch of the American Nature Study Society, the college of agriculture is giving considerable attention to the promotion of nature study in the State, especially through the public schools. There is to be a department of nature study at the next summer session of the university.

Work is being actively carried on at the substation in the Imperial Valley, for which a state appropriation of $6,000 is available for the current biennium. The general supervision of the substation has been delegated to Prof. R. E. Smith, who is also supervising in particular the horticultural investigations which are to form a special feature of its work, in addition to his previous duties as plant pathologist and the supervision of the substation at Whittier. W. E. Packard, who received his master's degree at the university in 1909 for special studies in soils and irrigation, is in immediate charge of the Imperial Valley Substation, with headquarters at El Centro. Investigations of live stock diseases have been begun by the assistant veterinarian.

Florida Station.—John Schnabel, gardener at the Missouri Station, has been appointed assistant in horticulture in charge of gardening, to begin work April 1.

Hawaiian Sugar Planters' Station.—George W. Kirkaldy, for the past 6 years assistant entomologist, died in San Francisco February 2, following a surgical operation by which he was seeking relief from the results of an accident received several years before. Mr. Kirkaldy was born and educated in England, and was 36 years of age.

Iowa College and Station.—The vacancies recently noted in the department of farm crops have been filled by the appointment of H. D. Hughes, of the Missouri University and Station, as professor of farm crops; H. B. Potter, of the South Dakota College and Station, as assistant professor; and George Livingston, assistant in agronomy at the Ohio State University, as instructor.

Kansas College and Station.—C. A. Scott, associate professor of forestry in the Iowa College and forester in the station, has been appointed Kansas state forester, with headquarters at the college, and will enter upon his duties at the close of the collegiate year.

Michigan Station.—Orrin B. Winter, a graduate of the University of Michigan, has accepted the position of assistant chemist, and entered upon his duties February 15.

Nebraska University and Station.—J. H. Gain has been promoted to the position of head of the department of pathology and veterinary science, vice Dr. A. T. Peters, whose resignation has been previously noted.

Ohio State University.—Vernon M. Shoesmith, associate professor of agronomy, has resigned to become head of the department of farm crops in the Michigan College and agronomist in the station.

Pennsylvania College and Station.—John W. Gregg, for the past two years head of the department of horticulture at the Baron de Hirsch School, Woodbine, N. J., has been appointed assistant in horticulture and has entered upon his duties.

South Dakota College and Station.—The new addition to the chemical laboratory is being used temporarily to accommodate the school of agriculture. The fruit-breeding house, authorized by the legislature a year ago, is nearly completed, and will be used entirely in the work of originating hardy fruits for western conditions.

Leroy F. Miller, assistant in dairy chemistry, resigned January 1 to accept a commercial position, and H. J. Besley, assistant in agronomy in the college and assistant chemist in the station, has resigned to accept a position with the Bureau of Plant Industry of this Department. William White, a 1908 graduate of the Minnesota University, has been appointed assistant in dairying.

Texas Station.—The station has transferred its headquarters to the new station administration building recently completed at a cost of $40,000. Wilmon Newell, entomologist of the Louisiana Crop Pest Commission, has been appointed entomologist of the station and state entomologist.

The location of seven new substations, authorized by the last legislature, has been decided upon by the locating board, consisting of the governor, lieutenant governor, and state commissioner of agriculture, as follows: At Pecos in Reeves County, at Lubbock in Lubbock County, at Spur in Dickens County, at Denton in Denton County, at Temple in Bell County, at Beaumont in Jefferson County, and at Angleton in Brazoria County. Of these the two last named are to give special attention to rice problems. The localities at which the several stations are to be situated have contributed liberally for their establishment, in some instances donating the land and erecting the necessary buildings and improvements.

A state appropriation of $1,000 annually for the current biennium has become available for tobacco investigations in cooperation with the Bureau of Plant Industry of this Department at its tobacco station at Nacogdoches.

Virginia Truck Station.—C. S. Heller, assistant horticulturist, resigned February 1 to accept a position as instructor in market gardening in the Massachusetts College.

Wisconsin University and Station.—A department of experimental breeding has been established under the direction of Dr. Leon J. Cole, of the Sheffield Scientific School and formerly of the Rhode Island Station, who has been appointed associate professor of experimental breeding. Investigations in experimental breeding with special reference to the laws of heredity and the improvement of animal life will be undertaken, together with some instruction to advanced students.

Wyoming University and Station.—Leslie B. McWethy has resigned as agronomist, and was succeeded March 1 by T. S. Parsons, a graduate and postgraduate student of the South Dakota College.

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EXPERIMENT STATION RECORD.

Editor: E. W. ALLEN, Ph. D., *Assistant Director.*
Assistant Editor: H. L. Knight.

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LIST OF EXPERIMENT STATION AND DEPARTMENT PUBLICATIONS REVIEWED.

NOTE.—The publications of the United States Department of Agriculture may be purchased from the Superintendent of Documents, Washington, D. C., to whom all remittances should be made. The price of *Experiment Station Record* is $1 per volume, and there will be two volumes each year. The prices of other technical publications are given above. The publications of the State experiment stations are distributed from the stations and not from the Department.

EXPERIMENT STATION RECORD.

Vol. XXII. April, 1910. No. 5.

The observations and criticisms of an outside observer upon the agricultural colleges of this country are always interesting as reflecting an independent view point, and may be suggestive and helpful in calling attention to weaknesses which need correction as opportunity offers. To be effective, however, such an estimate will require that the subject be dealt with in a sympathetic manner and on the basis of an evident study of the whole situation surrounding agricultural education. This will include both the history and spirit of the movement, and will recognize the peculiar difficulties which have had to be met in developing a system of agricultural education adapted to the needs of this country. It will take intelligent account of the diverse demands made upon these colleges, the necessity they have been under of respecting popular conceptions and leading public sentiment, and the status of information in regard to agriculture at the time their work began, the material for teaching, and the teaching force available.

Despite the progress which is making in the broader appreciation of the agricultural colleges, they still suffer to some extent from a prejudice which dates from their inception, and which underrates the character and the influence of their work. This misconception is reflected in public writings, in an attitude which does not accord to them full credit for the position they have attained, and in an apparent reluctance to class the work of any of these institutions as being of college grade.

The composite nature of the organization and activities of the land-grant institutions makes it difficult to deal with them on the same basis as with other colleges. Indeed their variety of structure stands in the way of a consistent discussion about them, considered as a class of institutions. This difficulty is intensified by the loose popular designation applied to them indiscriminately when they are designated as "agricultural colleges."

While we appreciate the difficulties involved in the nomenclature of these institutions, we do not believe that a just consideration of them

with reference to agricultural education, either historically or in the present, can proceed on the assumption that either the federal or state laws under which they are organized were intended to create simply institutions for agricultural education. Whatever their name, these institutions were so organized as to enable them to give instruction in many branches, and they naturally followed popular demand in their development.

Whenever agricultural education is under discussion with reference to the land-grant colleges we should as far as possible separate out the funds, equipment, and personnel in these colleges which have been devoted to agricultural education, and judge of their status and results as related to agricultural education by the means which they have actually had for this purpose. Such differentiation would, for example, bar out a comparison of Iowa State College as a whole with the Ontario Agricultural College. It would also prevent such misleading statements as that "no other calling has been so subsidized by the Government through education as agriculture," when it is evident from the connection in which the statement is made that the whole land-grant institution is in mind.

There is an apparent feeling among some writers on the subject that the land-grant colleges should have been organized simply as agricultural colleges, and they are criticised for introducing mechanic arts and engineering except so far as these subjects have direct relation to agriculture. This view runs counter to the federal legislation relating to these institutions and to the history of the movement which resulted in their establishment. The act of 1862 expressly states that these colleges are "to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life." It must be evident to every careful observer that for many years agriculture had only a relatively small share of attention in the land-grant colleges, whose resources were largely used for other branches of education. It is well to keep this steadily in mind in judging of the results obtained by these institutions in advancing agricultural education and practice.

A close analysis of the land-grant institutions and the use of their funds for various purposes will relieve agricultural education of the burden of responsibility for very much of the work of these institutions which has falsely been attached to it. Such a study will also doubtless remove the misconception that the land-grant (or Morrill) act was, as has recently been said, "really the act of one man," and show it rather to have been the culmination of a movement going on in this country for more than half a century prior to 1862.

Any view of education as related to agriculture which considers it primarily from the standpoint of "farming" as a "trade" is dis-

appointing and shows little indication of a broad conception regarding it. Even on its practical side agriculture is very much more than "farming," and there can be no system of agricultural education worthy of the name which, even in its lower ranges, does not take into account the human problems of country life. From any educational point of view agriculture is not properly considered in the same class as what is ordinarily called a "trade."

Especially when higher institutions of learning are under consideration it is important that we should have in mind agriculture as signifying a broad fundamental industry conducted under a great variety of forms and conditions, based on complex scientific principles, and involving economic and sociological factors the importance of which we as yet only dimly apprehend. It is a condition under which a large share of the people live.

The scope of the agricultural college is not always clearly realized, even among men engaged in other branches of education. It is thought of too often as relating merely to the education of farmers' boys for farming, and the graduates who do not devote themselves to farming are regarded as having in a sense obtained their education under false pretenses, and are cited to illustrate the manner in which these institutions are being prostituted. The field of the agricultural college is the whole industry of agriculture—all that pertains to the production and handling of agricultural products, the economics of the business, the protection of the industry from fraud of various kinds, and the life and conditions under which the industry is carried on. In no other branch of industrial education does the public take so narrow and superficial a view in judging of success or apparently expect so much by way of tangible results. The trouble is that in the popular conception, and often that of educators in other branches, agriculture signifies merely farming.

It is well to remember that the training of men for the agricultural vocations includes not merely general farming, dairying, stock raising, and the like, but the horticultural pursuits, fruit growing, landscape gardening, park superintendence, seed and nursery business, forestry, fertilizer manufacture, agricultural editing, and such professional branches as veterinary science, agricultural botany, agricultural chemistry, agricultural engineering, economic entomology, and the like. The mission of the true college includes also the education of agricultural teachers for different grades of work, of men capable of experimentation and research, and of national, state, and municipal experts. It is beginning to include also studies in the economics of agriculture, the sociological problems of the open country, and the movements for rural betterment.

It is only when we take the broad view of agriculture that we are able to understand what a task it has been to build up, even to such

an extent as we have, a system of education fairly comprehensive in its aim and scope, to develop a real science of agriculture, and to organize a great popular movement for the betterment, not only of agricultural practice, but also of the general conditions of country life. And it is only in this way that we can fairly judge the results of the work of those sections of the land-grant colleges which have actually been devoted to agricultural education and research.

The practical influence of the agricultural college is not easily estimated without a wide study, and if judged by the testimony of the average farmer, is likely to be much underrated. Any such estimate must inevitably take account of the experiment stations, which are an outgrowth and integral part of these institutions.

Despite a frequent popular conception, the principal activities of the colleges and stations have not been on the theoretical side, however technical their work may sometimes seem in its intermediate stages. The extension of the college's influence to the farmers and country people, although comparatively new, has been a function of far greater import than it is usually credited with. This function has until recently rested in large measure on the experiment stations, which have had little if any special funds for the purpose. The farmers' institute system has in some cases been in charge of the college, and in others in the hands of the state department or board of agriculture or other local agencies. These varied efforts are now being gathered together and systematized in special extension departments; and although it has not always found expression in its organization, the work of the agricultural college is generally recognized as falling under three heads—the investigation work of the experiment station, the instruction of the collegiate departments, and the extension features.

The short courses held by many of the colleges, sometimes at the colleges and sometimes in different localities in the State, are properly classed as extension work. These have reached many thousand young men from the farms and large numbers of practical farmers. They have been large factors in preparing the way for the reception of collegiate work. The farmers' week now held at a considerable number of colleges has proved immensely popular, with an attendance which has taxed to the utmost the capacity of the institutions. Educational trains have been operated in every section of the country, over steam roads, electric roads, and even steamboat lines. Farmers' excursions have been run to the colleges, bringing large numbers to spend a day going over the institution. Local cooperative experiments to demonstrate improved methods have been conducted extensively; cattle-testing associations have been organized to stimulate interest in keeping better grades of dairy stock; local post-mortem

demonstrations on tuberculous cattle have been held, which have increased the demand for tuberculin tests in Wisconsin, for example, from a few thousand a year up to over forty thousand last year.

In addition to these extension features, large numbers of popular addresses have been given every year to bodies of farmers, educational exhibits held at various places, many articles prepared for the press, and information bulletins distributed freely.

If the farmers have not been reached it is not because there has not been an earnest and energetic effort made to reach them. The interest, ingenuity, and earnest endeavor in that direction are worthy of high praise and appreciation, and the success which has actually been met with is far beyond that apparently realized by the casual observer. Whether or not it is true that "no calling has been so subsidized by the Government through education as agriculture," it is a fact that no similar amount of funds or body of workers has resulted in bringing about such profound changes in the practice of any art, the mental attitude of those engaged in it, and the standing of any industry or branch of human activity. It may be true of these efforts, as a recent article states, that the "total outcome is not so great as one might expect," but in judging of this the conditions under which this work has been performed should be clearly borne in mind and the present status of agricultural practice, of agricultural literature, and of agricultural teaching should be compared with that prevailing fifty years ago.

The agricultural colleges can not fairly be held responsible for the backward condition of agricultural practices which their teachings have deprecated, have shown the means of remedying, and have attempted to correct. To point to the fact that these colleges have "not yet been able to check the waste of the resources of the soil" is equivalent to saying that the theological schools and the church have not been able to eliminate crime, the engineering schools have not resulted in utilizing the latent power of the waterfalls of the country or prevented the immense waste of food and fertility through the systems of sewer and refuse disposal of cities, or that the old-style literary colleges have not checked the demand for inferior and sensational literature.

By far the greatest achievement of the agricultural colleges and experiment stations has been the impressing on multitudes of practical men the results of experimental inquiry in such way that these results have been widely applied in practice, and in some lines have revolutionized agricultural industries throughout the country. It is altogether probable that many farmers who are the most sparing in their appreciation of the college services are doing many things differently on their own farms from what they would have done if the bulletins of the stations had not been issued. Farmers very often

do not know the real source of the new light which they see and follow.

But, however that may have been, the measure of the relative success of the colleges in this direction is fairly determined when we take into account the number of workers in them and the extent of their means for this work, as compared with the vastness of our agricultural domain and population, the range of our agricultural activities, and the operation of general economic forces entirely beyond the control of educational institutions or even governments and nations.

Even if every farmer on the mailing lists of these colleges had been effectively reached, less than one-tenth of our farmers would have been touched in this way. Everybody connected with the agricultural colleges will readily admit that the great mass of our farmers are still outside the direct influence of these institutions. It would be easy to bring millions of farmers to confess that they know little or nothing of agricultural colleges and experiment stations. The great desire and the most earnest effort of these colleges are now for the development of more widespread and effective agencies for bringing the results of their work home to the masses of farmers, through itinerant lectures, movable schools, demonstration fields, railroad specials, etc. The cry for men and funds wherewith to do this work is heard on every hand.

Nevertheless, with a small number of men and quite limited funds the colleges have in the past reached more people and changed their practice than was ever done in the same time by the same number of men since the world began. This up to date is their crowning glory, and it is the most hopeful presage of what they will accomplish when adequately equipped and sufficiently supplemented by extension departments, secondary schools, and other agencies for the popularization of agricultural knowledge.

It may be well enough for the advocates of the conservation of natural resources to lay great stress on the deterioration of our soils by a careless and wasteful system of agriculture, and to point out the importance of keeping up and increasing soil fertility so that production may keep pace with our rapidly increasing population. This is indeed by far the greatest of the conservation problems, and no class of men have been more active in preaching this doctrine than our agricultural teachers and experimenters. But our soils and our agriculture are not, broadly speaking, in the ruinous state in which they are often depicted by the arousers of public sentiment on this great question, and the strong statements of even the more conservative of conservation advocates before popular audiences must not be taken too literally when we are calmly considering our agricultural history

and future, or the relation of agricultural colleges to agricultural progress.

The fact is we are nearing the close of a period of the vastest and most rapid expansion of agriculture over a continent which history has or probably will record. Up to the present time we have had a surplus of fertile unoccupied lands on our hands which we have been only too glad to give away to any people who would undertake their cultivation on any terms. One result of this was the wholesale depression of the agricultural industry until the profits were so small that the wonder is that so many intelligent people were willing to remain on the soil. There was absolutely no incentive to keep up fertility. Land was the cheapest thing we had. The whole effort was to extend acreage, and by means of labor-saving machinery and otherwise to produce crops as cheaply as possible and skim the cream of virgin soils with the utmost rapidity. When one region was somewhat worn out the agricultural people moved on to another. Or if they did not do this they sought a cheap fertilizer to help make their crops. No body of experts and no amount of funds for the promotion of agriculture could have aroused any effective sentiment in favor of intensive methods and careful treatment of soil.

The colleges and stations were inevitably driven to spend their main energies in finding crops to grow on new land, cheap fertilizers, means of repressing insects and diseases, cheap rations for animals, protection of farmers against fraud in the purchase of fertilizers and feeding stuffs, methods of conducting such industries as dairying so that the farmer's family would be relieved of their burden, and other things suited to an era of expansion and cheap lands. The measure of their success should be looked for in these directions. They were so busy doing these things that they might have been excused if they had done nothing else. We believe that history will conclude that their achievements in those lines were both relatively and absolutely very great. At any rate the determination of their success does not rest on so narrow a basis as their relation to the deterioration of the country's soils.

But they were not content with this. They have led the way in pointing out the inevitable results of the rapid and wasteful expansion of our agriculture, have showed the evil effects of the lack of rotation of crops, and have been among the foremost agencies in arousing and organizing public sentiment in favor of more rational farming. By reason of their studies of soils, fertilizers, crops, and animal production the colleges are now in a position to show the farmer, as the price of his land and his products advance and new lands are no longer available, how to adapt his methods to the new conditions; and when population flows back over the old lands, as it

has already begun to do, the restoration of soil fertility will be relatively rapid.

In this respect we are more fortunate than any other people has ever been. The period of our wasteful agriculture has been shorter and the means at hand for restoration and improvement are far greater than other peoples have enjoyed. Prices are not likely to sink again to the former ruinous level, and the prospect is that ere long we shall have more contented and permanent agricultural communities than ever before.

It is obvious, of course, that the agricultural colleges have not been of uniform grade and that some of them have been compelled to include secondary work. The necessity for this has grown out of the school systems of the respective States, which have required the colleges to maintain preparatory departments and prevented their raising the entrance requirements beyond a certain point.

While some of these colleges have found little or no difficulty in conforming to the standards of the Carnegie Foundation, others have not regarded so great a change as advisable at the present time. This must necessarily be a local question, dependent on the educational system of the State and the position of the college in that system. If the college is to teach agriculture to the young people of the State, its grade should be a practical one, possible of attainment through the existing school system. It is more important that the needs of the State should be met and the people taught the principles underlying their greatest industry, than that arbitrary and impractical standards should be striven for in order that rank of a certain class may be attained.

On the other hand, the land-grant colleges should not fail to put themselves in line with the general movement to perfect the school systems of the States. As rapidly as the development of these institutions make it possible, the colleges should separate out their secondary work, direct their attention to the strictly college functions, and make their standards conform to the new conditions. This course they are definitely committed to, and there is unanimity upon the point that the real mission of the agricultural college properly conducted is to do the work of a true college, with its experiment station and its extension department. In striving to fulfill this mission the college can not attempt to cover the whole field of agricultural endeavor, but must frankly acknowledge its limitations.

This view was set forth in a recent editorial, and coincides with the opinion expressed by the Association of American Agricultural Colleges and Experiment Stations at the Portland convention last year. It was clearly the prevailing sentiment of the association that the secondary work in agriculture should be definitely differentiated

from college work, with the establishment of standard requirements for entrance to the latter and for graduation. This the colleges can now do with less difficulty than ever before. Provision for secondary instruction in agriculture is being made more rapidly each year, in response to a popular demand. This demand has reached not only the public schools but private schools and academies and many endowed colleges, especially in the central West.

A recently prepared list shows that, aside from the colleges of agriculture and mechanic arts, there are now fully eight hundred and sixty institutions in the United States giving regular courses of instruction in agriculture, as compared with about five hundred and fifty a year and a half ago. Of these nearly seven hundred fall in the class of public and private high schools, normal schools, and academies, and hence are offering instruction of secondary grade. In addition, there are forty-four industrial and farm schools where agriculture is taught, usually in a more elementary way. In an increasing number of cases credit for admission to the colleges of the State is being given for agricultural work done in the high schools and academies.

These things show how vast has been the change in public sentiment and attitude toward agriculture as a teaching subject. They furnish a striking illustration of the potent and far-reaching influence which the agricultural college has exerted.

The recognition of agriculture as worthy of a place in the secondary school curriculum, and the influence of teachers in thorough sympathy with country life, will have a potent influence on the country boy. The least value of such teaching would be through "trade" instruction and operations on the farm. But in opening the mind of the student to the possibilities of improved agriculture and the betterment of country life, the aid which the intelligent farmer may have through the experiment stations and other public agencies, and the satisfaction, as well as profit, to be derived from the rational study and practice of his art, the public schools may easily become a powerful factor toward holding young people on the farms and improving farm practice on a wide scale. Such instruction will increase the demand for extension work of the agricultural colleges, as well as fill their halls with a much larger body of students.

With the establishment of elementary and secondary courses in agriculture in thousands of schools, the development of a thorough system of extension teaching and demonstration, our agricultural colleges and experiment stations can and will devote themselves to the higher work for which they are especially organized.

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RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

The nitrogen-containing radicle of lecithin and other phosphatids, H. MacLean (*Bio-Chem. Jour., 4 (1909), No. 5–7, pp. 240–257; abs. in Jour. Chem. Soc. [London], 96 (1909), No. 562, I, pp. 547, 548*).—This work further confirms the author's previous conclusions (E. S. R., 21, p. 362) that lecithin contains other nitrogen groups than cholin and that probably part of this nitrogen is present in the form of amino acid. The formula for lecithin as it is at present employed can not therefore be considered correct.

The lecithin and iron content of milk, W. Glikin (*Biochem. Ztschr., 21 (1909), No. 3–5, pp. 348–354*).—In an investigation to determine whether or not lecithin exists in appreciable amounts in skimmed milk, there was found in the original whole milk 0.05158 per cent, and in the cream 0.05004 per cent. The remainder, 0.00154 per cent, is within the limits of error and the author concludes, therefore, that the milk serum contained no lecithin. A sample of woman's milk with a lecithin content of 0.13294 per cent gave after extraction with ether 0.0004516 per cent phosphoric acid, corresponding to 0.00513 per cent of lecithin.

As the iron in bone marrow stands in close relation to the lecithin content it was also deemed of interest to know if the same relation existed in milk. The total iron content of the milk was found to range between 0.00984 and 0.0068 per cent, and that of the lipoids from 0.0059 to 0.0022 per cent, or about one-half the total iron. The lecithin content ranged from 0.13294 to 0.05158 per cent. An increase in the lecithin content also indicated a higher iron content.

A relation between the chemical constitution and the optical rotatory power of the sugar lactones, C. S. Hudson (*U. S. Dept. Agr., Bur. Chem. Circ. 49, pp. 8*).—The author presents the hypothesis that "lactones of dextrorotation have the lactonic ring on one side of the structure, lactones of levorotation have it on the other, and the position of the ring shows the former position of the O H group on the γ-carbon atom." Tables are presented to illustrate that ground for the hypothesis exists and further data are given to show the application of the theory to determine the constitution of the sugars.

Formaldehyde from beet leaves and roots, L. Gentil (*Bul. Assoc. Chim. Sucr. et Distill., 27 (1909), No. 3, pp. 169–179; abs. in Chem. Ztg., 33 (1909), No. 126, Repert., p. 538*).—By carefully distilling 1 kg. of beet leaves, the author obtained 0.005 gm. of formaldehyde while from 1 kg. of beet roots, from 0.003 to 0.005 gm. were found. Old leaves and roots yielded only traces. The author at first assumed that this intermediary production of formaldehyde was the cause of the sluggish fermentation of beet juice in alcohol manufacture, but after looking into the matter more closely found that such was not the case and that such fermentations are probably due to an incomplete inversion of the sugar.

Colloid chemistry and the soil, H. GEDROIZ (*Zentbl. Agr. Chem., 38 (1909), No. 7, pp. 433–435*).—The author seeks to explain some of the phenomena which occur in soils by colloid chemistry.

Neubauer's method for potash, B. SCHMITZ (*Chem. Ztg., 33 (1909), No. 127, pp. 1127, 1128*).—A comparative study of the methods of Fresenius' abbreviated method and that of Neubauer's (Finkener's old method). The Neubauer method is considered very accurate, to have none of the cumbersomeness of the sulphuric acid method, and to have the further advantage of saving platinum chlorid.

Determination of phosphoric acid in mineral phosphates, G. JÖRGENSEN (*Analyst, 34 (1909), No. 402, pp. 392, 393; abs. in Jour. Soc. Chem. Indus., 28 (1909), No. 19, pp. 1052, 1053*).—A description of the method used in Denmark as official.

The detection and determination of lead in drinking water, G. PINCHBECK (*Pharm. Jour. [London], 4. ser., 29 (1909), No. 2406, p. 663*).—A description of the qualitative and quantitative methods for lead in drinking water.

Food inspection and analysis, A. E. LEACH (*New York and London, 1909, 2. ed., rev. and enl., pp. XVIII+954, pls. 40, figs. 120*).—This work (E. S. R., 16, p. 488) has been revised and brought up to date by the addition of new material by A. L. Winton. The chapter on flesh foods has been rewritten and the protein nomenclature of the American Physiological Society and Society of Biological Chemists has been added.

Modified combustion bomb for calorimetric and analytical purposes, H. LANGBEIN (*Chem. Ztg., 33 (1909), No. 119, pp. 1055, 1056, figs. 2*).—The modification consists of the substitution for the inner platinum or enamel lining of the bomb of enamel cups which can be easily replenished when worn out. The heat equilibrium is established in about 4 minutes, as in the Bertholet calorimeter.

Determination of phosphorus in organic substances by the bomb calorimeter, P. LEMOULT (*Compt. Rend. Acad. Sci. [Paris], 149 (1909), No. 11, pp. 511–513*).—If a substance like anilin phosphate, triphenylphosphine, etc., is placed within the bomb in a porcelain dish coated with potassium nitrate, a complete oxidation of the carbon and phosphorus is brought about. The water which is at the bottom of the bomb dissolves the phosphoric acid thus formed and it may be determined by precipitation as ammonium magnesium phosphate.

Methods for the quantitative chemical analysis of animal tissues, W. KOCH ET AL. (*Jour. Amer. Chem. Soc., 31 (1909), No. 12, pp. 1329–1355*).—A series of papers discussing physiological chemical methods.

Variations observed in the composition of lard, E. DURIER (*Ann. Falsif., 2 (1909), No. 13, pp. 489–493, fig. 1*).—A discussion as to the influence of such factors as the feeding of the animal, the parts of the carcass from which the fat was taken, and the methods of extraction (water bath and direct fire) and deodorization, upon the ultimate results obtained on analysis. Analytical results are given.

Examination of flour, E. SCHAFFNIT (*Ztschr. Untersuch. Nahr. u. Genussmtl., 17 (1909), No. 2, pp. 86–88, fig. 1; abs. in Chem. Ztg., 33 (1909), No. 128, Repert., p. 549, fig. 1*).—An apparatus is described with which the microscopical examination and the Benecke color test can be carried on simultaneously.

Judging flour by its catalase content, P. LIECHTI (*Chem. Ztg., 33 (1909), No. 119, pp. 1057*).—The author found that the quality of a flour can be easily judged by the amount of oxygen it liberates from peroxid of hydrogen. As the branny portion of the seed or kernel has the greatest catalytic action, flour high in bran can be detected. See also a previous note by Wender (E. S. R., 17, p. 996).

Substances in the crust of bread and in biscuits which give the ferric chlorid reaction, A. BACKE (*Ann. Falsif., 2 (1909), No. 13, p. 509*).—On examining ordinary bread crust and biscuits the author finds that the same ferric chlorid reaction is obtained as that with Nestle's milk flour.

Rice flour, E. COLLIN (*Ann. Falsif., 2 (1909), No. 12, pp. 428–439, figs. 7*).—This is a discussion of the characteristics of rice flour and methods for its detection in foods.

The quantitative determination of cane sugar by the use of invertase, C. S. HUDSON (*U. S. Dept. Agr., Bur. Chem. Circ. 50, pp. 8, fig. 1*).—The author shows that invertase will hydrolyze cane sugar without notably affecting other substances such as starch, dextrin, maltose, pentosans, and natural glucosids, and suggests its use for the determination of cane sugar. The method proposed is as follows:

"Dissolve 26 gm. of the substance to be analyzed for cane sugar in water, clarify with the usual substances (neutral or basic lead acetate or alumina cream or kaolin) and make up to 100 cc. volume at 20° C. Filter and read the polarization of the filtrate, S, for a 200 mm. tube. Remove the excess of lead from the filtrate, if lead has been used as clarifying agent, with sodium carbonate or potassium oxalate and filter. To 50 cc. of the filtrate add acetic acid by drops until the reaction is acid to litmus, add 5 cc. of the stock invertase solution and make up the volume to 100 cc. Add a few drops of toluene to the solution to prevent the growth of micro-organisms, shaking so as to saturate, and allow to stand at any temperature between 20 and 40° overnight. Under usual conditions about 6 hours' time is required to accomplish complete hydrolysis. In the morning bring the temperature to 20° and read the rotation of the solution, I, for a 400 mm. tube. The percentage of cane sugar present is then calculated by the formula: Per cent of cane sugar$=\frac{S-I}{141.7-\frac{T}{2}}\times 100$," where S is the direct reading of the solution, I the reading of the inverted solution, T the temperature, and 141.7 the inversion constant.

Directions for the preparation of the invertase solution, which is made from baker's or brewer's yeast, are given. Its rotation was 1.0° V in the 400 mm. tube. It was dextrorotary.

New procedure for determining sugar by Bonnan's method, P. MAILLARD (*Ann. Chim. Analyt., 14 (1909), No. 9, pp. 342–348; abs. in Analyst, 34 (1909), No. 404, p. 500*).—This is a description of a procedure which is supposed to insure against possible discrepancies due to improper conditions of ebullition. The author has compiled a table in which the time relation for the titration is considered.

A delicate reaction for sugars, POZZI-ESCOT (*Bul. Assoc. Chim. Sucr. et Distill., 27 (1909), No. 3, pp. 179, 180; abs. in Chem. Ztg., 33 (1909), No. 126, Repert., p. 538*).—If 1 cc. of a 5 per cent ammonium molybdate solution is mixed with 2 cc. of a cane sugar solution (over 0.0005 per cent) and a contact test made with 10 to 12 cc. concentrated sulphuric acid, a blue colored ring is obtained within 20 minutes. If the upper portion of the mixture is heated to the boiling point, as little as 0.00002 per cent of sugar can be detected within 30 minutes.

Clarification of solutions containing invert sugar, C. A. BROWNE, A. H. BRYAN, and H. W. WILEY (*Ztschr. Ver. Deut. Zuckerindus., 1909, No. 645, II, pp. 922–932; abs. in Chem. Ztg., 33 (1909), No. 126, Repert., p. 543*).—It is concluded from these investigations that for lead vinegar neutral lead acetate should be substituted. It is advisable to control the purity of the latter by determining its lead content by both the specific gravity and the usual analytical method.

The best results were obtained when the dry solid subacetate of lead, prepared according to Horne, was employed.

The unification of tables for comparing the specific gravity with the sugar content, E. SAILLARD (*Ztschr. Ver. Deut. Zuckerindus., 1909, No. 646, II, pp. 1000–1007*).—A discussion in reference to the temperature for taking the specific gravity and the temperature at which the glassware required is standardized.

Refractometry of molasses, SAILLARD (*Circ. Hebd. Syndicat Fabr. Sucre France, 1909, No. 1065; abs. in Chem. Ztg., 33 (1909), No. 118, Repert., p. 507*).—In a comparison of the refractometric and usual drying methods for dry substance in molasses the difference was less than 0.24 per cent in 60 per cent of the cases and greater in 40 per cent. In only a few instances was the difference more than 0.8 per cent.

Coppered vegetables and determining copper therein, G. STEIN (*Ztschr. Untersuch. Nahr. u. Genussmtl., 18 (1909), No. 9, pp. 538–550*).—This is a general discussion of the subject and of an effort to ascertain the most accurate method to determine the copper in canned peas, beans, and the accompanying liquor. The methods discussed are Brebeck's, von Graff's modification of Brebeck's method, and the electrolytic method. A description of a new method for which is claimed the simplicity of the von Graff method and the accuracy of the electrolytic method is given.

Contributions to the examination of cocoa and its preparations, A. PROCHNOW (*Beiträge zur Untersuchung des Kakaos und seiner Präparate. Diss. Tech. Hochschule Braunschweig, 1909, pp. 70*).—This investigation dealt chiefly with determining the xanthin bases, the fat content, the purity of the fat, and the presence of cocoa shells (a) by determining the iodin number, (b) by determining the crude fiber, (c) estimating the pentosans and methylpentosans.

The author concludes from his work that the Katz-Beckurts-Fromme method for determining the theobromin is the best. For fat, Soxhlet's method is to be retained. The range of fat for cocoa (now 40 to 54 per cent) is recommended to be raised to from 50 to 56 per cent. The purity of the fat should be determined by the usual methods. No new method for testing for animal fats was discovered. To detect gross adulteration the Filsinger-Drawe method and the pentosan determination according to Tollens-Kröber are recommended.

Chemical composition of tea leaves during various stages of growth, S. SAWAMURA (*Bul. Imp. Cent. Agr. Expt. Sta. Japan, 1 (1907), No. 2, pp. 145–147; abs. in Chem. Zentbl., 1908, I, No. 9, pp. 668, 867; Ztschr. Untersuch. Nahr. u. Genussmtl., 18 (1909), No. 10, p. 619*).—As the growth progresses the water, total nitrogen, and thein content diminishes while the ether extract, crude fiber, and tannin become greater.

The surface tension and viscosity determined in milk by Traubes stalagmometers, R. BURRI and T. NUSSBAUMER (*Biochem. Ztschr., 22 (1909), No. 1–2, pp. 90–102*).—The authors sought to determine the changes which occur in the viscosity and surface tension of milks kept at a constant temperature of 20° C. and further the influence of cooling on the viscosity and surface tension.

It is shown that during the first 12 hours there is a decrease in the surface tension but a slight increase in the viscosity. Cooling does not, however, act in the same manner. In a milk where the temperature did not go lower than 20° the surface tension fell only slightly, but cooling to 10° produced a marked depression. The surface tension of the milk reaches the minimum depression limit which could be established upon cooling the milk to 0° or freezing it. The viscosity test showed no such great variation on cooling. Heating a milk, which had been cooled, back to body temperature (37°) did not restore the surface tension of the original milk.

Analysis of altered milk, A. KLING and P. ROY (*Ann. Falsif., 2 (1909), No. 8, pp. 257-263; abs. in Chem. Ztg., 33 (1909), No. 117, Repert., p. 502*).—The authors draw attention to the fact that bichromate of potash is not always fatal to the bacteria in the milk but simply checks their action, and that evidences of decomposition are present in the milk with the formation of volatile products which bring about serious error in the total solids determination. A method based upon the observation that milk kept under proper conditions in well-closed bottles retains the fat and total nitrogen in an unchanged condition is proposed.

Total solids in milk preserved with formaldehyde, H. HOFT (*Chem. Ztg., 33 (1909), No. 128, p. 1133*).—Milks preserved with formaldehyde (0.5–1 cc.: 300–500 cc.) showed no appreciable variation from the original as to the content of total solids after standing from 2 to 6 months.

A new method to distinguish boiled from raw milk, A. ROCHAIX and L. THEVENON (*Compt. Rend. Soc. Biol. [Paris], 67 (1909), No. 31, pp. 475–477; abs. in Rev. Gen. Lait, 8 (1909), No. 1, p. 22*).—To 2 cc. of the filtrate obtained by coagulating 20 cc. of the milk under test and shaking and filtering are added 4 to 5 drops of peroxid of hydrogen and 2 to 3 cc. of a 4 per cent solution of pyramidon. After shaking the mixture and heating it slightly a violet coloration is obtained. Upon adding a mixture of calcium chlorid and manganese sulphate this reaction is intensified.

Detection of boiled milk by the microscope, W. MORRES (*Milchw. Zentbl., 5 (1909), No. 11, pp. 502–505, figs. 3*).—Milk which has been heated and slowly cooled will show within the fat globules a mycelium-like vegetation of fatty acids. On the other hand, milk heated and cooled more rapidly will show various transition stages from fine needles up to diamond-shaped crystals. See also a previous note (E. S. R., 22, p. 212).

Alcohol-alizarin test for milk, W. MORRES (*Molk. Ztg. [Hildesheim], 23 (1909), No. 47, pp. 1319, 1320*).—The author recommends the use of alizarin instead of litmus in conjunction with the alcohol test for milk. A color scale has been prepared, the various depths of color being referred to a certain degree of acidity. The scale further shows the consistency of the flakes precipitated by the alcohol. The alcohol test, according to the author, can be modified for the purpose of making it less expensive by using smaller quantities of alcohol and milk, and also by the use of denatured alcohol.

A modified method to determine salt in butter, J. M. BARNHART (*Chem. Engin., 10 (1909), No. 5, pp. 165, 166, figs. 1*).—The author proposes a method which in his opinion has none of the tendencies to inaccuracy which are present in the official method. In his method the salt is extracted from the residue left from the indirect fat determination by boiling it in hot water. Suction is applied to the Gooch crucible, in order to remove washings by filtration, and a filtrate of about 100 cc. is collected in a 150 cc. beaker. After cooling the beaker it is placed in a porcelain jar, in order to get a white background and titrated in the usual way.

Moisture determination in cheese with various ovens, VON SOBBE (*Milchw. Zentbl., 5 (1909), No. 11, pp. 505–509*).—The Soxhlet oven, when compared with the ordinary oven, gives more accurate results and is more easily manipulated. The only disadvantage it has is the length of time required in heating up the oven to the proper temperature at the beginning.

Estimation of lactic acid in cheese, S. SUZUKI and E. B. HART (*Jour. Amer. Chem. Soc., 31 (1909), No. 12, pp. 1364–1367*).—Comparisons were made between Palm's method, based on the formation of basic lead lactate, Partheil's distillation method, and the usual zinc lactate method. The authors conclude from their work that the Palm method when used quantitatively yields low results.

The Partheil method is not applicable when the mixture contains such acids as malic, citric, succinic, tartaric, and oxalic. Good results were obtained with the usual method of extraction with ether after acidifying and separation of the zinc salt.

The detection and determination of saccharin, G. TESTONI (*Ztschr. Untersuch. Nahr. u. Genussmtl., 18 (1909), No. 10, pp. 577–587*).—This is a description and discussion of the methods for detecting and determining saccharin in the presence of salicylic, benzoic, citric, tartaric, and tannic acids, and volatile and fatty oils. Two new methods have been worked out, one of which is based on the determination of the sulphur radicle of the saccharin, and the other on the hydrolysis of the saccharin with hydrochloric acid, which forms the monoammonium salt of sulphobenzoic acid.

Ethereal oils and odoriferous bodies, F. ROCHUSSEN (*Ätherische Öle und Riechstoffe. Leipsic, 1909, pp. 190, figs. 9*).—A brief description of these bodies is given with methods of their manufacture and examination, the more common adulterations, and the utilization of these products.

The determination of the volatile acids of tobacco, etc., J. TÓTH (*Chem. Ztg., 33 (1909), No. 119, p. 1061*).—A reply to Kissling (E. S. R., 22, p. 11).

Estimation of fat in feces, P. ROCHAIX (*Jour. Pharm. et Chim., 6. ser., 30 (1909), No. 11, pp. 487–491*).—The purpose of this method is to determine the nature of the total fatty matter in the feces. It consists of extracting the dried feces with anhydrous ether, which extracts the fatty acids and neutral fats. The fatty acids are then determined titrametically, and the neutral fats by difference. The soap which is retained in the fecal residue is treated with hydrochloric acid which liberates the fatty acids. These are shaken out with ether and titrated with decinormal sodium hydroxid solution. The author recommends decinormal oxalic acid for titrating back the excess of alkali.

The technique of the qualitative analysis of feces, R. GAULTIER (*Compt. Rend. Soc. Biol. [Paris], 67 (1909), No. 32, pp. 509–511*).—A critical discussion.

Examination of cresol soap solution, R. RAPP (*Apoth. Ztg., 24 (1909), No. 70, pp. 641, 642; abs. in Chem. Ztg., 33 (1909), No. 117, Repert., p. 503*).—The disinfecting value of phenol homologues increases with the ascension of the series.

The apples in the fermentation industry, H. C. HOLM (*Pure Products, 5 (1909), No. 12, pp. 632–637*).—This is the second of a series of popular articles on cider making.

The sweetening of cider by the addition of saccharose or glucose, G. WARCOLLIER (*Ann. Falsif., 2 (1909), No. 12, pp. 425–427*).—From numerous analyses made at the Caen Pomological Station it is shown that the glucose-levulose ratio of ciders which contain at least 10 gm. of total sugar per liter lies between 0.4 and 0. If this figure is found to be between 0.5 and 1 the addition of saccharose may be suspected, if greater than 1, the addition of glucose.

The cold storage of apple cider, H. C. GORE (*U. S. Dept. Agr., Bur. Chem. Circ. 48, pp. 13, figs. 9*).—Experiments were conducted with Tolman, Winesap, Yellow Newtown, Ralls, Gilpin, Baldwin, Golden Russet, Roxbury Russet, and Kentucky Red varieties of apples for the purpose of obtaining procedures which could later be applied to the commercial preparation of cider. The fruit employed in all instances was seconds. The must was chilled as soon as pressed from the apples to 32° F., and kept at that temperature in cold storage. There was no noticeable fermentation for a period varying from 36 to 57 days with the first 6 varieties mentioned above, and 83 days in the case of Golden Russet, Roxbury Russet, and Kentucky Red.

"These ciders were held for a period of from 90 to 119 days, an average of 99 days for the first 6 varieties and of 125 days for the last 3, before they fer-

mented sufficiently to be considered as becoming 'hard' or 'sour.' The ciders were found to have suffered no deterioration (with the exception of the Tolman), but rather had become more palatable during storage."

Organoleptic tests and chemical analyses are included.

Home manufacture of cider vinegar, L. L. Van Slyke (*Mo. Bd. Hort. Bul. 1, pp. 15*).—A description of the manufacture of cider vinegar with a discussion of the whys and wherefores of the various steps in the process.

Manufacture of dry tomato conserve (*Bol. Soc. Fomento Fabril [Chile], 26 (1909) No. 11, p. 562*).—A brief general description of the process.

Relation between the nitrogen content of barley and the extract yielded by the malt, J. Fries (*Ztschr. Gesam. Brauw., 32 (1909), pp. 500–503; abs. in Jour. Soc. Chem. Indus., 28 (1909), No. 20, p. 1098*).—The content of nitrogen in 100 samples of 1908 barley was compared with the extract yielded by the manufactured malt. The results indicate that with a high protein content in the barley there is a corresponding decrease in the yield of extract in the resulting malt.

The amount of spirits extracted from a ton of raisins, A. J. Perkins (*Jour. Dept. Agr. So. Aust., 13 (1909), No. 3, pp. 193–198*).—In 3 experiments with first-grade raisins, yields of 155.17 gal., 147.21 gal., and 153.77 gal. of proof spirits per ton were obtained. Similar experiments with second-grade raisins gave yields of 135.47 gal., 133.51 gal., and 137.94 gal. The author makes a reply to his critics and gives suggestions for the handling of raisins for distillation.

By-products of cotton seed and their utilization, C. Beadle and H. P Stevens (*Jour. Soc. Chem. Indus., 28 (1909), No. 19, pp. 1015–1020, fig. 1*).—This is a description of the use of cotton-seed hulls for paper making and cattle feeding.

METEOROLOGY—WATER.

Agricultural meteorology, E. G. Locke, edited and supplemented by B. I. Sreznevski (*Sel'skokhozyaĭstvennaya Meteorologhiya. Yuryev, 1908, pp. 348; rev. in Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 10 (1909), No. 3, pp. 443, 444*).—The work contains the following chapters: The problems of agricultural meteorology and the organization of observations, weather forecasting and service, popular signs regarding the weather, phenological observations, composition and chemistry of the air, influence of the meteorological factors on plants, temperature of the air, temperature of the soil, humidity of the soil, influence of humidity on plants, precipitation—origin, distribution, and influence on crops, protection against droughts and hail, evaporation by plants, the wind and dust phenomena, insolation, diffused light and influence of cloudiness, consumption of light according to Wisner, significance of the color of the rays, electricity, relations between growth and yields, and the general conditions of the weather.

Wind and weather, L. Weber (*Wind und Wetter. Leipsic, 1909, 2. ed., pp. IV+116, figs. 28, dgms. 3*).—This is a second revised edition of this manual which summarizes in small space the more important principles and facts relating to meteorology.

Frosts and hail, A. Rolet (*Les Gelées et la Grêle, Guide pour la Défense et la Protection des Récoltes, à l'Usage des Viticulteurs, Horticulteurs, Agriculteurs. Paris, [1909], vols. 1, pp. 124; 2, pp. 127*).—This book is designated as a guide to the defense and protection of crops, for the use of viticulturists, horticulturists, and agriculturists. The various practical methods which have been proposed for the protection of crops against frosts and hail are described,

as well as the organizations which have been formed in France for protection and insurance against damage from this source.

International catalogue of scientific literature. F—Meteorology (*Internat. Cat. Sci. Lit., 6 (1908), pp. VIII+257*).—This is the sixth annual issue of this catalogue, covering mainly the literature of 1906, but also including some references to the literature of 1901 to 1905 omitted from previous issues.

International catalogue of scientific literature. F—Meteorology (*Internat. Cat. Sci. Lit., 7 (1909), pp. VIII+284*).—This is the seventh annual issue of this catalogue, covering mainly the literature of 1907, but also including some references to the literature of 1901 to 1906 omitted from previous issues.

A new method of weather forecasting, G. GUILBERT (*Nouvelle Méthode de Prévision du Temps. Paris, 1909, pp. XXXVIII+343, pls. 3, figs. 85; rev. in Nature* [*London*], *82 (1910), No. 2097, pp. 271, 272*).—This book explains in detail the principles underlying the method employed by the author in his successful contests for the prize offered by the Belgian Society of Astronomy, Meteorology, and Terrestrial Physics in 1905 for the most accurate short-period forecasts of weather. This method is based upon two new principles, which the author explains.

It is stated in the first place that if in any region the observed wind forces are markedly in excess of the normal for the prevailing barometric gradient at sea level a surge of high pressure in the direction of the gradient may be looked for and vice versa. "It follows from this general principle that a depression which is surrounded on all sides by winds in excess of the normal will fill up, whereas a depression surrounded by winds in defect will grow deeper. If the defect is great, a depression of small intensity will develop into a violent storm center. A depression round which the distribution of wind force as compared with the prevailing gradient is unsymmetrical will move toward the region of 'least resistance,' i. e., the region where the winds are most conspicuously in defect. In identifying the region of least resistance the second principle is also used. It is based on the conception of 'divergent' winds. Any wind which has a component directed away from a center of low pressure is divergent for that center, and as such marks a region of low resistance to its advance. Generally speaking, the greater the 'divergence' the less the 'resistance.' Strong northerly or northwesterly winds to the eastward of a depression are looked upon as an extreme case of divergence, and as a sure sign of a rapid advance of the depression."

A large number of rules for forecasting, based upon these two fundamental principles, are elaborated, and the application of these rules is illustrated by a large number of examples taken mainly from forecasts issued by the weather bureau at Paris. The principles enunciated and the rules given are a direct result of a careful study of weather maps; "they are entirely empirical, and no attempt is made to justify them from general dynamical considerations."

The book contains a preface by B. Brunhes, director of the Puy de Dôme observatory, which calls attention to the fact that Guilbert's rules are consistent with results deduced by Lord Kelvin and Bjerknes for the action of a steady current on a vortex, and describes some laboratory experiments of his own illustrating the phenomena.

Evolution of barometric lows and Guilbert's rules for weather forecasting, B. BRUNHES (*Rev. Gén. Sci., 20 (1909), No. 9, pp. 393–406, figs. 8*).—This article is a reprint of the preface of the book noted above.

The influence of the moon on the earth's atmosphere, SCHUSTER (*Der Einfluss des Mondes auf unsere Atmosphäre. Karlsruhe, 1908, pp. 31, pls. 2*).—With the observations of the Karlsruhe Meteorological Station as a basis the

attempt is made to show by means of tabular data and charts the relation between phases of the moon and barometric pressure. The general conclusion reached is that the moon in its phases exerts an appreciable influence upon the earth's atmosphere. Whether this is direct or indirect has not been definitely determined.

The relation of weather to crops and varieties adapted to Arizona conditions, A. J. McClatchie and J. E. Coit (*Arizona Sta. Bul. 61, pp. 465–524, fig. 1*).—This is in substance a revision of Bulletin 48 of the station (E. S. R., 16, p. 235). "The arrangement and a few of the statements and conclusions have been changed somewhat in order to make them accord more fully with the facts brought out by an additional five years of observation. By far the greatest change, however, has been the interpolation of a large amount of information in regard to the adaptation of different varieties to different parts of the Territory. This information has been secured not only from records which have been accumulating at the station farm but from personal visits to and circular letters sent out to many farmers in all parts of the Territory."

Evaporation in a bog habitat, M. G. Dickey (*Ohio Nat., 10 (1909), No. 2, pp. 17–23, figs. 2*).—Observations on evaporation at different places on a bog island in the Licking Reservoir near Columbus, Ohio, are reported, and the results are discussed with reference to the influence of humidity, temperature, and wind velocity. The effect of the growth of leaves in the early part of the season and their fall at the end of the period of observation was also noted. A short list of references to literature on the subject is given.

Bulletin of the Mount Weather Observatory (*U. S. Dept. Agr., Bul. Mount Weather Observ., 2 (1909), pt. 3, pp. 109–182, figs. 33, charts 6*).—This number contains the following articles: Certain Laws of Radiation and Absorption and a Few of Their Applications (illus.), by W. J. Humphreys; An Unusual Display of False Cirrus, by W. J. Humphreys; The Aerological Congress at Monaco, by A. L. Rotch; and Upper Air Data (illus.), by W. R. Blair.

Report of the Chief of the Weather Bureau, 1907–8 (*U. S. Dept. Agr., Weather Bur. Rpt. 1907–8, pp. XXXIII+397*).—Part 1 of this document consists of an administrative report reviewing the operations of the Weather Bureau during the year; part 2 gives a list of observing stations and changes therein during 1907, and twice-daily observations for 29 selected stations during 1907; part 3, monthly and annual meteorological summaries for 188 stations; part 4, monthly and annual means and annual extremes of temperature and dates of first and last killing frosts, 1907; part 5, monthly and annual precipitation, 1907, and monthly and seasonal snowfall, 1907–8; and part 6, miscellaneous meteorological tables and reports.

The work of the year at Mount Weather was seriously interfered with by the destruction of the administration building by fire October 23, 1907, nevertheless daily meteorological observations were continued as well as the special studies on the upper air and in terrestrial magnetism and solar physics. A new formula for computing the solar constant was developed as a result of seven years' study of the problem of the measurement of the total heat which reaches the outside limits of the earth's atmosphere from the sun. The use of the upper air observations at Mount Weather in the weather forecasts issued at Washington was extended. Forecasts for periods of about a week in advance were made experimentally during the year.

Reference is made to the beginning of the preparation of a new series of climatological papers, "in which the records of precipitation, temperature, dates of the first and last killing frosts, and prevailing wind directions are collected, the precipitation tables including all available data since the year 1871. These reviews are made comprehensive for small sections of the United

States, which it is intended gradually to cover in this manner. The papers will be of value to agriculturists, engineers requiring data on water resources, and other citizens who seek information regarding the climate of the several sections."

Monthly Weather Review (*Mo. Weather Rev., 37 (1909), Nos. 7, pp. 265–410, figs. 7, charts 32; 8, pp. 411–550, charts 32; 9, pp. 551–696, figs. 2, charts 32; 10, pp. 697–840, figs. 3, charts 32*).—With the July number several important changes were made in the contents of the Review. It now contains "representative climatological data covering the general climatology, the daily precipitation, and daily maximum and minimum temperatures" for each of 12 climatological districts, practically coinciding with the great drainage basins of the United States. "The data for each of the 12 districts will be edited by local representatives familiar with the country, who will prepare monthly summaries made up from the notes written by the several section directors."

Section bulletins will not be issued as heretofore, but separates will be available for distribution in the respective districts.

The Review will continue to give "the usual data regarding the forecasts, the river stages, the storm tracks, and similar matter. Besides these there will be prepared each month several charts covering the climatology of the United States, for the precipitation and the temperature conditions of the month."

The change in form of publication was rendered desirable by the organization of an inter-Bureau service, including the Forest Service and the Bureau of Plant Industry of this Department, and the Reclamation Service, Water Resources Branch of the Geological Survey, and Office of Indian Affairs of the Interior Department.

"The purpose of this inter-Bureau cooperation is to secure observers to make records of the amount and condition of the snowfall and rainfall along the sources of the rivers utilized farther on by the irrigation and power projects at lower levels. In a general way the U. S. Weather Bureau supplies the necessary apparatus, instructs the observers, and makes a small payment for the taking of the required observations, while the cooperating Bureaus render most valuable service in securing observers and in installing the apparatus. A good beginning has been made in the work of organizing this inter-Bureau service in respect to the water resources of the semiarid regions of the West, but it will take some time to extend it as far as required by the demands of the people."

The four numbers here noted contain climatological summaries for the 12 climatic districts referred to above, weather forecasts and warnings for July, August, September, and October, 1909, respectively, river and flood observations, special papers on general meteorology, including lists of additions to the Weather Bureau library and of recent papers on meteorology and seismology, a condensed climatological summary, and climatological tables and charts.

Meteorological observations at the Massachusetts Agricultural Experiment Station, J. E. OSTRANDER and C. M. DAMON (*Massachusetts Sta. Met. Buls. 251, 252, pp. 4 each*).—Summaries of observations on pressure, temperature, humidity, precipitation, wind, sunshine, cloudiness, and casual phenomena during November and December, 1909, are presented. The general character of the weather of each month is briefly discussed, and the December bulletin gives a summary for the year. The principal data in this summary are as follows:

Pressure, reduced to freezing and sea level (inches).—Maximum, 30.75, January 8 and 16; minimum, 28.84, March 25; mean, 30.006. *Air temperature*, in ground shelter (degrees F.).—Maximum, 94, August 8; minimum, −8.5, December 30; mean, 46.8. *Humidity*.—Mean dew-point, 38.2; mean relative humidity, 76.8. *Precipitation*.—Total rainfall or melted snow, 39.12 in.; number of days on which 0.01 in. or more rain or melted snow fell, 128; total snow-

fall, 31 in. *Weather.*—Total cloudiness recorded by sun thermometer, 1,944 hours, or 44 per cent; number of clear days, 112. *Bright sunshine.*—Number of hours recorded, 2,510, or 56 per cent. *Wind.*—Prevailing direction, northwest; total movement, 63,513 miles; maximum daily movement, 705 miles, April 8; minimum daily movement, 19 miles, November 28; maximum pressure per square foot, 27.5 lbs., April 8, north-northwest. *Dates of frost.*—Last, May 12; first, October 13. *Dates of snow.*—Last, April 29; first, October 17.

Meteorological summary for 1908, C. A. PATTON (*Ohio Sta. Bul. 205, pp. 279-297*).—This summary includes as usual notes on the weather of each month and tabulated daily and monthly records of observations at the station at Wooster, Ohio, on temperature, precipitation, cloudiness, direction of the wind, etc., and for comparison, similar data for 21 previous years (1888–1908) at the station and for 26 years (1883–1908) in other parts of the State.

The mean temperature for the year at the station was 51° F., for the State 52.1°; the highest temperature at the station 95°, August 3 and September 24 and 25, for the State 104°, August 3; the lowest temperature at the station −3°, February 9, for the State −22°, February 9. The annual rainfall at the station was 33.94 in., for the State 34.09 in. The number of rainy days at the station was 117, for the State 111. The prevailing direction of the wind was southwest at the station and for the State.

Meteorological conditions of the year 1908 (*Ann. Uffic. Prov. Agr. Bologna, 15 (1908), pp. 244-249*).—In general the weather conditions during the year at Bologna were favorable, especially for wheat and grapes. The summer drought was unfavorable for forage crops, corn, and potatoes. Tables are given showing for each month in the year the maximum, minimum, and average temperature and barometric pressure, the precipitation, state of the sky, and miscellaneous items, including number of days with rain or snow, fog, frost, wind, and hail.

Meteorological observations, M. BOULATOVITCH (*Ghodīchnuĭ Otchet Ploty. Selsk. Khoz. Opuitn. Stanziĭ, 14 (1908), pp. 1-51, 169-176*).—Observations on precipitation (including snowfall), evaporation, humidity of the air, temperature of the air and soil, sunshine and cloudiness, wind movement and barometric pressure at the Ploty Experiment Station are reported as in previous years.

The distribution of rainfall in the southeastern European peninsula, F. TRZEBITZKY (*Mitt. Justus Perthes' Geogr. Anst., 55 (1909), No. 8, pp. 186-188, chart 1*).—The distribution of rainfall in Greece, Turkey, Bulgaria, Roumania, and adjacent countries is charted and discussed with reference to variation as dependent upon topography and sea winds.

[Temperature and rainfall, Cape of Good Hope] (*Statis. Reg. Cape Good Hope, 1908, pp. 45, 46*).—The available data on temperature and rainfall are summarized.

Meteorology, C. H. KNOWLES (*Rpt. Agr. Fiji, 1908, pp. 15-19*).—Observations on temperature, rainfall, humidity, sunshine, and wind movement at various points in Fiji for the year 1908 are summarized and briefly discussed with reference to the growth of crops during the year.

Climate of Argentina, G. G. DAVIS (In *Censo Agropecuario Nacional la Ganadería y la Agricultura en 1908. Buenos Aires: Govt., 1909, vol. 3, pp. 611-721, charts 44*).—This is an exhaustive summary of the climatic features of the country.

Climatology of the Colombian Plateau, J. DE DIOS CARRASQUILLA (*Rev. Min. Obras Pub. [Colombia], 4 (1909), No. 10, pp. 750-756, dgm. 1*).—The principal climatological characteristics of this region are described.

The climate of India according to the latest data, A. WOEIKOW (*Met. Ztschr., 26 (1909), No. 11, pp. 481-496*).—The main climatic characteristics of India are described on the basis of data contained in the *Indian Meteorological*

Memoirs and *Climatological Atlas of India*, issued under the direction of Sir John Eliot (E. S. R., 18, p. 526). It is stated that the climate of India is better known than that of any other region of so great extent.

The public utility of water powers and their governmental regulation, R. TAVERNIER and M. O. LEIGHTON (*U. S. Geol. Survey, Water-Supply Paper No. 238, pp. 161*).—This paper shows the governmental methods of dealing with the problem of water power in France, Switzerland, Italy, and the United States.

The quality of surface waters in the United States.—Part I, Analyses of waters east of the one hundredth meridian, R. B. DOLE (*U. S. Geol. Survey, Water-Supply Paper No. 236, pp. 123*).—This report gives methods of analysis, location of sampling stations, and detailed results of analyses of surface waters east of the one hundredth meridian. Later reports will discuss the analyses in relation to stream flow, climate, forestation, geologic environment, pollution, and other factors, as well as the use of the waters for industrial purposes and chemical denudation.

The search for underground water, L. CHAPTAL (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 30 (1909), No. 46, pp. 615–619*).—The various topographic and geological characteristics which must be borne in mind in locating underground water are described and the methods of professional locators of ground water are briefly discussed.

The pollution of streams by sulphite pulp waste.—A study of possible remedies, E. B. PHELPS (*U. S. Geol. Survey, Water-Supply Paper No. 226, pp. 37, pl. 1*).—This paper deals with the pollution of Lake Champlain and the James, Potomac, and Black rivers; the manufacture of sulphite pulp; and the composition and utilization of sulphite pulp waste liquor.

It is shown that stream pollution by the waste from sulphite pulp mills is extensive and wasteful, 2½ billion pounds of solid matter from this source being turned into the rivers and lakes of the United States every year. The successful disposal of this liquor depends upon the utilization of the so-called lignone which it contains. This lignone is used to a slight extent as an adhesive and as a source of tannin. It gives by nitration a series of dyes which may have some commercial value.

Disinfection as an adjunct to water purification, H. W. CLARK and S. DEM. GAGE (*Jour. New England Water Works Assoc., 23 (1909), No. 3, pp. 302–323*).—Tests of disinfection with permanganate of potash and bleaching powder in connection with mechanical filtration indicated that complete sterilization of a highly polluted water can not be secured by the use of either of these agents unless they be employed in extremely large amounts. Better results were obtained when the bleach was used in combination with sulphate of alumina in mechanical filtration. The authors believe that disinfection should not be depended upon in any case, but should be followed by filtration.

Studies on the purification of sewage by means of peat beds, A. MÜNTZ and E. LAINÉ (*Monit. Sci., 4. ser., 23 (1909), II, No. 813, pp. 589–606, figs. 2, dgms. 3*).—Already noted from another source (E. S. R., 21, p. 416).

Sewage disposal at country houses (*Engin. Rec., 60 (1909), No. 25, pp. 681–683*).—This is an abstract of an address by J. D. Watson at a meeting of the Institution of Sanitary Engineers of England. The information needed in the selection and installation of an efficient sewage system for country houses is discussed.

For ordinary conditions, the establishment of a bacterial plant on the percolation system is recommended. This should consist of (1) a septic or sedimentation tank, (2) a percolation bed, and (3) a small sand filter or other suitable means of removing organic matter from the bacteria bed effluent. The use of subirrigation as a suitable means for the latter purpose is dis-

cussed. It is stated that subirrigation is easily installed and efficient in operation if given the proper attention.

The hygienic importance of pond culture, W. Cronheim (*Landw. Jahrb., 38 (1909), Ergänzungsb. 5, pp. 253-263*).—The use of fish ponds for the disposal and utilization of sewage is discussed. It is shown that a certain amount of sewage can be purified and profitably disposed of by turning it into fish ponds and thus increasing the plant and animal growth in the ponds.

Pond fertilizing and purification of sewage, W. Cronheim (*Ztschr. Landw. Kammer Schlesien, 13 (1909), No. 33, pp. 976-981*).—Experiments with superphosphate, sulphate of potash, and nitrate of soda, as well as with sewage, to increase growth of food plants in ponds are briefly referred to and the advantages of the practice are discussed.

Pond fertilizing, Kuhnert (*Ztschr. Landw. Kammer Schlesien, 13 (1909), No. 48, pp. 1457-1460*).—Experiments with Thomas slag, kainit, lime, and nitrate of soda are reported, and the advantages of the use of such materials in ponds are discussed.

The utilization of sewage for the production of crude oil and ammonia, M. F. Purcell (*Trans. Inst. Min. Engin. [Gt. Brit.], 35 (1907-8), pt. 4, pp. 537-544; abs. in Chem. Abs., 4 (1910), No. 1, p. 72*).—In an effort to find some better method of utilizing filter press sludge than its application as a fertilizer, the author made experiments on a small scale in which the dry sludge was subjected to distillation as in case of shale. In this way considerable amounts of ammonium sulphate, crude oil suitable for gas enrichment, and a residue valuable for cement manufacture, besides combustible gases which could be utilized in drying the sludge, were obtained at an estimated profit somewhat higher than that obtained from shale distillation. It was found on an average that from 9 to 10 gal. of oil and from 57 to 65 and in some cases 100 lbs. of ammonium sulphate per ton of sludge were obtained.

SOILS—FERTILIZERS.

Changes in the composition of the loess soils of Nebraska caused by cultivation, F. J. Alway (*Nebraska Sta. Bul. 111, pp. 3-19*).—The term loess as applied to Nebraska soils is defined and the results of analyses of samples of typical loess soil from different parts of the State (Antelope and Lancaster counties) taken at different depths from the surface inch to the sixth foot are reported. A comparison is also made of the composition of the surface soil of prairie fields with that of adjacent long-cultivated fields of which the history for 30 to 40 years is known. The average results of this comparison were as follows: Potash—prairie 0.67 per cent, cultivated soil 0.65 per cent; phosphoric acid—prairie 0.07 per cent, cultivated soil 0.07 per cent; lime—prairie 0.48 per cent, cultivated soil 0.48 per cent.

The results show in general that "in their virgin condition the loess soils of eastern Nebraska are rich in potash, nitrogen, humus (vegetable mold), and unhumified organic matter. The supply of lime is good and that of phosphoric acid is fair to good. Judged on the basis of their chemical composition these loess soils would be rated very fertile and likely to long maintain their productive capacity if kept in good physical condition and well supplied with nitrogen and organic matter.

"The content of phosphoric acid, potash, and lime, being no lower in the subsoil than in the surface soil, no lowering of the percentages of these three constituents is produced by the blowing away or washing away of the surface. The content of nitrogen, humus, and unhumified organic matter decreases rapidly

from the surface downward. Accordingly erosion, either by wind or water, impoverishes the surface soil.

"Chemical analyses do not show any difference between virgin prairies and long-cultivated fields in the proportion of potash, phosphoric acid, and lime; they do show, however, a great loss of nitrogen, humus, and unhumified organic matter in the case of all fields long under cultivation.

"The greatest losses of organic matter, nitrogen, and humus have been caused either by the washing or by the blowing away of the surface soil."

The question of preventing erosion by water and wind and maintaining the supply of humus and nitrogen in these soils is discussed.

Soils of Pender County, North Carolina: A preliminary report, H. H. BENNETT (*U. S. Dept. Agr., Bur. Soils Circ. 20, pp. 16*).—This is an account of preliminary examinations made in June, 1909, of soils at a number of points in this county to determine the character and agricultural possibilities of the important types. The region studied is in the Atlantic Coastal Plain and borders upon the Atlantic Ocean, with a water frontage of 12 miles and extending inland a distance of 35 miles. The area presents the appearance of a plain interrupted by slight surface unevenness due to erosion. Notes are given upon the climate and agriculture of the county and the soil conditions are described. There are considerable areas which are in need of drainage.

The soils have been derived from materials washed down from the Piedmont region and deposited in the sea that formerly covered this coastal plain area. The Norfolk fine sandy loam is the most extensive, and on account of its good natural drainage the most used soil type of the area. Besides this type there are several areas of Norfolk fine sand, Portsmouth fine sandy loam, and smaller areas of several other types. Suggestions are made as to the best use to be made of the different types in crop production.

Contribution to the study of Bolognese soils, F. COSTANZINI (*Ann. Uffic. Prov. Agr. Bologna, 15 (1908), pp. 173–179*).—Determinations of the percentage of lime in various samples of soils submitted are reported. Analyses of 3 soils are also given. Fertilizers for permanent meadow, for cereals, and for forage crops are recommended.

The dynamic viewpoint of soils, F. K. CAMERON (*Jour. Indus. and Engin. Chem., 1 (1909), No. 12, pp. 806–810*).—This paper, which deals with various phases of the more recent theories of soil fertility, is summarized as follows:

"(1) Hitherto, the soil has generally been regarded from a static viewpoint. It now appears more rational to view it dynamically.

"(2) From the static viewpoint, fertilizers are valuable chiefly as sources of plant food. From the dynamic viewpoint this function is generally a minor one, and fertilizers have certainly other important functions of a physical, chemical, and biological character.

"(3) Some advocates of the static viewpoint would make a distinction between fertilizers and stimulants. But this requires to be shown, and as now used these terms are merely a begging of the question at issue.

"(4) Everyone believes in crop rotations. Advocates of the static viewpoint hold that it always hastens the depletion of mineral plant nutrients in the soil. This is at least doubtful.

"(5) The advocates of the static viewpoint hold that under cropping, mineral plant nutrients necessarily disappear and soil 'exhaustion' is due to this fact. But the evidence now available does not warrant these premises, and the cause or causes of exhaustion must be sought elsewhere, among others, in the character of the organic substances in the soil, and the biological processes there taking place.

"(6) The advocates of the static viewpoint hold that crop yields are decreasing, owing to depletion of available plant food. But crop yields are increasing and factors other than the plant food supply are the dominating ones.

"(7) To the advocates of the static viewpoint, soil chemistry is simple, and merely a matter of supplying enough mineral nutrients in 'available' form for the crop needs. As a matter of fact, soil chemistry is a very complex subject, into which we are just beginning to get glimpses, and the supply of mineral nutrients is only one of the important details in a very intricate problem. Soil fertility will only become simple, if ever, when we have a much fuller and more comprehensive knowledge of the physical, chemical, and biological processes taking place in the soil. To attain this knowledge, the soil must be regarded from the dynamic viewpoint."

The soil considered as a reserve food supply, MAIZIÈRES (*Engrais, 24 (1909), No. 36, pp. 993–995; abs. in Chem. Abs., 4 (1910), No. 1, p. 74*).—It is pointed out that ordinary cultivated soils contain sufficient amounts of nitrogen, phosphoric acid, and potash to give large yields for many years, but that as a rule these constituents exist largely in unassimilable forms and that too small a proportion of them becomes available each year to give maximum yields without the use of readily available fertilizers.

The availability of the soil potash in clay and clay loam soils, F. W. MORSE and B. E. CURRY (*New Hampshire Sta. Bul. 142, pp. 39–58, fig. 1*).—The data upon which this bulletin is based have already been noted (E. S. R., 21, pp. 713, 714, 715). The bulletin deals particularly with the water-soluble potash in soils, how to increase the availability of the soil potash, and what becomes of the potash added in fertilizers. Among the more important facts brought out are:

"The clay and clay loam soils carry large quantities of potash. The potash in these soils is soluble enough to supply potash for heavy crops of grass without artificial reenforcement.

"Additional potash when supplied in commercial fertilizers does not affect the yield or the composition of the grasses. The amount of potash required for a grass crop is proportional to the yield.

"A comparison made between the amount of water-soluble potash in these soils, the amount of potash in the crop, and the amount of soil water required to produce the crop, shows that the addition of potash fertilizers is not necessary. This relation stands for these soils when large yields are produced by the addition of other fertilizer.

"It is shown that when lime reacts with feldspathic minerals the potash dissolves. Also when clay is present, as in these soils, no increased amount of soluble potash is produced. This is because of the action of the clay on the solubility of potash.

"A large part of the potash in fertilizers is changed to an insoluble condition soon after it is applied to the soils. When the potash is rendered insoluble other bases go into solution. Lime has decided effects on these by-products."

On the fertility of soils with regard to phosphoric acid, A. KOSTZYELETZKII (*Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 10 (1909), No. 3, pp. 321–354, figs. 5*).—Two lines of investigation are reported, (1) a comparison of the yields obtained in pot experiments with samples of the same soil taken at different depths with the amounts of phosphoric acid found in the soil by treatment with varying proportions of a weak solvent, and (2) the use of cultures of *Aspergillus niger* in soil investigations.

The physical properties of the soil samples were very similar, but, as shown by chemical analysis, there was a considerable variation in the phosphoric acid content. Oats was the crop grown, and the data show that there was a close

agreement between the yields and the amount of phosphoric acid dissolved by 1 per cent hydrochloric acid in the ratio of 100 parts of acid to 1 of soil.

Experiments are reported which show that by replacing a portion of the phosphoric acid and potash of nutrient solutions used for the growth of *A. niger* by soil extracts an indication of the amount and availability of phosphoric acid in the soil may be obtained from the growth of the organism.

The thermal effect of moistening the soil, A. MÜNTZ and H. GAUDECHON (*Compt. Rend. Acad. Sci.* [*Paris*], *149* (*1909*), *No. 6, pp. 377–381; Rev. Gen. Agron., n. ser., 4* (*1909*), *No. 10, pp. 385–389; abs. in Chem. Zentbl., 1909, II, No 24, p. 2032*).—Studies of the heat generated on moistening soils and various other substances as indicated by Mitscherlich (E. S. R., 17, p. 838) are reported. The apparatus employed by Berthelot in investigations in thermochemistry was used in these experiments, which were made with various kinds of soil and of mineral and organic substances.

The results show that clay, humus, starch, and organic substances in general, which evolve considerable heat in contact with water, evolve very little or none in contact with other liquids, such as benzene. Eighty-eight per cent alcohol was partially dehydrated when brought into contact with clay, humus, and starch which had been previously dried. The thermal effects resulting from the moistening of the constituents of the soils and of organic substances are very complex. The investigations reported show that these effects are produced with great frequency in the superficial layer of the soil and may have an influence on the reactions affecting the growth of plants.

The evolution of heat when dry soil is moistened, A. MÜNTZ and H. GAUDECHON (*Ann. Inst. Nat. Agron., 2. ser., 8* (*1909*), *No. 2, pp. 161–212, figs. 5; Ann. Sci. Agron., 3. ser., 4* (*1909*), *II, Nos. 5, pp. 393–400; 6, pp. 401–443, figs. 5*).—This is a more detailed account of investigations briefly noted above. It gives full data for studies not only on soils of widely different kinds but also on the constituent elements of these soils as separated by mechanical analysis and on various organic substances, the purpose being to determine what constituents are responsible for the thermal phenomena observed. As a rule the soils and other substances experimented with were dried at 110° C.

The results led to the general conclusion that the evolution of heat when dry soil is moistened is due to the fixation of the water by the very fine mineral constituents of the soil and by the organic matter. The attraction for the water is so strong in many cases that it is capable of removing water from compounds in which it is apparently in chemical combination, as, for example, 88 per cent alcohol.

In discussing the practical application of this phenomenon it is pointed out that plants may be injured by the elevation of temperature resulting from a fall of rain on a soil which has been subjected to strong sunshine.

Irrigation investigations: Factors influencing evaporation and transpiration, J. A. WIDTSOE (*Utah Sta. Bul. 105, pp. 64, figs. 8*).—This is one of the series of bulletins reporting irrigation investigations made by this station (E. S. R., 20, p. 814), which had for their object "the study of the mutual relations of plants, soils, and water, as these relations may indicate the most economic use of water for plant production."

The investigations reported in this bulletin were made entirely with pots under controlled conditions, especially with reference to percolation of water in the soil. The pots used were 2 ft. in diameter and 2½ ft. deep, and they were so arranged that irrigation water could be applied in three different ways, by surface irrigation, subirrigation, and water standing near the surface. Four different kinds of soil were used, (1) college loam, (2) clay, (3) sand, and

(4) Sanpete clay. The crops grown in the experiments included corn and wheat. A comparison was made of evaporation and transpiration from bare and cropped soils, from cultivated and uncultivated soils, and from fertilized and unfertilized soils.

The data, which are given in detail, show that cultivating or hoeing largely reduced the evaporation of water from bare soils. It generally increased the yield of dry matter but largely diminished the amount of water transpired for 1 lb. of dry matter and was much more effective on clay and sand soils than on ordinary loam soils.

"Shading diminished greatly the evaporation from bare soils [and] more water evaporated from bare soils under surface irrigation than under subirrigation or when the water stood near the surface.

"In the majority of cases, surface irrigation gave the largest yields of dry matter, subirrigation nearly as much, and standing water the smallest yields. Approximately the same number of pounds of water was required to produce a pound of dry matter under conditions of subirrigation and standing water; a somewhat larger number was required under conditions of surface irrigation. In all probability, the number of pounds of water actually transpired for the production of a pound of dry matter is the same under the various methods of irrigation.

"Subirrigation was most satisfactory on loam soils.

"The evaporation of water from bare soils increased with the increased saturation of the soil. The increase in the loss was usually much larger than the increase in saturation. Heavy irrigations should, therefore, be followed by immediate, careful, and thorough cultivation. Increasing the saturation of soils increased in a somewhat larger ratio the yields of dry matter. Approximately the same number of pounds of water is required under various conditions of soil saturation for the production of 1 lb. of dry matter. The amount of water actually transpired for each pound of dry matter appears to be somewhat lower under conditions of high saturation. . . .

"The yield of dry matter was much larger on soils that had rested during the preceding three years than on soils that had been cropped during the same period. The number of pounds of water required for 1 lb. of dry matter was much smaller on the soils that had been bare than on those that had been cropped during the preceding three years. . . .

"On fertile soils heavy applications of water are not likely to be so wasteful as on infertile soils. . . . Fertile soils will produce crops with a smaller amount of water than will infertile soils. The addition of fertilizers to infertile soils enables crops to produce dry matter at a lower water cost.

"Soils vary greatly in their relationship to plants and water.

"The seasons have a strong effect upon the yield of dry matter and upon the amount of water required for the production of 1 lb. of dry matter. The number of pounds of water required for the production of a pound of dry matter varies greatly with the crop, the soil, the season, the method of irrigation, and the cultivation. In general, however, the amount of water required for the production of dry matter is very much higher in an arid region than in regions of abundant rainfall. The conservation of moisture is, therefore, of greater importance in the West than in the East.

"Summer fallowing should be practiced on dry farms, first, to store the precipitation of two or more years for the use of one crop, and secondly, to set free an abundance of plant food which will enable crops to mature with less water."

Methods of bacteriological investigation of soils, V, F. Löhnis (*Centbl. Bakt.* [*etc.*], *2. Abt., 24* (*1909*), *No. 5–7, pp. 183–192*).—This article is contro-

versial in character and is devoted mainly to an answer to statements by H. Fischer (E. S. R., 21, p. 416).

Magnesia-gypsum disks and magnesia disks with organic matter as convenient solid substrata for the culture of nitrifying organisms, I. A. MAKRINOV (*Centbl. Bakt.* [*etc.*], *2. Abt.*, *24* (*1909*), *No. 13–15, pp. 415–423, pls. 2*).—The investigations here reported have been noted from another source (E. S. R., 22, p. 318).

Studies in soil bacteriology, III. Concerning methods for determination of nitrifying and ammonifying powers, F. L. STEVENS, W. A. WITHERS, ET AL. (*Centbl. Bakt.* [*etc.*], *2. Abt.*, *25* (*1909*), *No. 1–4, pp. 64–80, figs. 4*).—This paper is the third of a series on this subject (E. S. R., 21, p. 619), and deals mainly with the methods used by the authors in determining the nitrifying and ammonifying powers of soils.

Nitrogen assimilating micro-organisms, APELT (*Ztschr. Naturw.*, *80* (*1908*), *No. 3–4, pp. 300–302; abs. in Centbl. Bakt.* [*etc.*], *2. Abt.*, *25* (*1909*), *No. 10–13, p. 321*).—Brief references are made to the investigations of J. Kühn, Krieger, Henry, Berthelot, Winogradski, and Beijerinck.

Azotobacter chroococcum, its physiological properties and its activity in soil, A. KRAINSKII (*Zhur. Opuitn. Agron.* (*Russ. Jour. Expt. Landw.*), *9* (*1908*), *No. 6, pp. 689–749, figs. 8; abs. in Chem. Abs.*, *3* (*1909*), *No. 24, p. 2991*).—It was found in the investigations here reported that *A. chroococcum* varies widely with the age and nature of the nutrient substratum used in pure cultures. A marked characteristic is the development of a black pigment in the culture media in from 3 to 7 days. Levulose, inulin, and mannite were found to be the best sources of carbon for this organism. Arabinose and galactose were but slightly utilized, a fact which casts doubt upon the conclusion of Heinze that the organism feeds upon pectin compounds of the soil.

Respiration (evolution of CO_2) and nitrogen fixation were studied in a variety of media. The author concludes that nitrogen fixation is practically complete in 6 weeks. The best results were obtained in soils with small amounts of moisture, from one-half to three-fourths of the optimum content. The organism is apparently highly aerobic and does not develop well in a soil from which the air is excluded to any large extent by moisture. Sodium carbonate was more favorable to nitrogen assimilation than calcium carbonate, indicating that the beneficial action of lime is due simply to its alkalinity. The addition of carbon bisulphid increased both the amount and the intensity of the nitrogen fixation. This is attributed, contrary to Heinze's conclusion, not to direct action on the organism but to solution of the fats and waxes of the soil, thus increasing its porosity.

Fixation of free atmospheric nitrogen by Azotobacter in pure culture.—Distribution of this bacterium, M. W. BEIJERINCK (*K. Akad. Wetensch. Amsterdam, Proc. Sect. Sci.*, *11* (*1908–9*), *pt. 1, pp. 67–74*).—This article deals especially with the relation between Azotobacter and salts of organic acids, more particularly calcium malate. It is shown that considerable amounts of nitrogen are fixed by Azotobacter alone in pure cultures in which the carbon supply is derived from malates or similar organic salts, but that the fixation is greater when other organisms are associated with the Azotobacter. The use and value of nutrient media containing calcium malate instead of sugar for the study of the distribution of Azotobacter in the soil are explained. By means of the method a distinct relation was shown to exist between Papilionaceæ growing on the soil and the distribution of Azotobacter.

Bacteriological examination of nitro-bacterine, L. GRANDEAU (*Jour. Agr. Prat.*, *n. ser.*, *18* (*1909*), *No. 45, pp. 625, 626*).—Bacteriological examinations and pot tests with lupines made at the Stockholm experiment station showed

that the nitro-bacterine did not contain *Bacillus radicicola*, though Clostridium and a Coccus were present, and that the culture produced no tubercles on the roots of lupines. Inoculation by means of soil is considered preferable to the use of either nitragin or nitro-bacterine.

Soil inoculation experiments with nitragin and nitro-bacterine, E. GRABNER (*Jour. Landw., 57 (1909), No. 3, pp. 217–223, pls. 8; abs. in Deut. Landw. Presse, 37 (1910), No. 2, pp. 14, 15, figs. 8*).—Pot experiments with white lupines and sand peas on calcareous sandy soil are reported, showing that both inoculating materials, especially when used in connection with potash and phosphoric acid, were active, the nitro-bacterine being more effective than the nitragin, which was especially feeble in action on sandy soils deficient in lime.

Further experiments on the increase of nitrogen in soils by means of free living bacteria, A. KOCH (*Jour. Landw., 57 (1909), No. 3, pp. 269–286*).—A continuation of previous investigations on this subject (E. S. R., 20, p. 17) is here reported, and the results obtained during the 5 years, 1905 to 1909, that the investigations have been in progress, are summarized. The investigations dealt particularly with the effect on nitrogen fixation of adding sugars to the soil and with the relative efficiency of different carbonaceous foods for the nitrogen-fixing organisms.

In pot experiments with buckwheat, beets, wheat, and oats grown in succession it was observed that the effect of increased nitrogen fixation due to the addition of sugar to the soil in 1905 was evident in increased yields in 1909, except in one series of experiments, in which sugar was added at the rate of only 100 gm. per 18 kg. of soil. In pot experiments with pure sand the rate of fixation was 7.2 mg. of nitrogen per 100 gm. of sand containing 2 gm. of cane sugar during a period extending from March 4 to June 1. There was, however, a decline in yield of buckwheat and mustard grown on the sand, which is ascribed to the injurious effect of the products of decomposition of the sugar. These injurious products remain longer in sand than in loam soil and can not be of benefit in sand in rendering plant food available.

Field experiments similar to those conducted in previous years showed in case of wheat, rye, and oats grown in succession that the benefit from increased nitrogen fixation due to the addition of sugar was least the first year, but was marked the second and third years. That the fixation was due mainly to Azotobacter was shown by experiments with a number of different kinds of soil containing varying numbers of this organism. It was shown that the distribution of Azotobacter is very irregular in soils, many of the soils examined being largely or totally deficient in the organisms. In such soils there was little fixation of nitrogen.

A comparison of mannite, dextrose, xylan, glycerin, calcium succinate, and calcium butyrate as sources of carbonaceous food for nitrogen-fixing organisms showed that only mannite and dextrose possess any particular value for this purpose.

Investigations on the action of moor soils as a fertilizer with especial reference to the nitrogen content, F. HERRMANN (*Ber. Physiol. Lab. u. Vers. Anst. Landw. Inst. Halle, 1909, No. 19, pp. 126–177*).—Peat from different sources was compared with stable manure with and without the addition of lime in a series of pot and field experiments.

Peat from upland and lowland moors was used. The former contained in the air dry condition 1.12 per cent of mineral matter, 0.17 per cent of lime, 0.04 per cent of phosphoric acid, and 0.86 per cent of nitrogen. Two samples of the lowland peat contained in the air dry condition 17.64 and 17.38 per cent, respectively, of mineral matter, 6.59 and 6.19 per cent of lime, 0.35 and

0.17 per cent of phosphoric acid, and 3.05 and 3.13 per cent of nitrogen. The peat and manure were used in mixture with sand or a very poor sandy soil. The experimental crop was winter rye.

The results, which are given in great detail, show in general that the peat exerted a decided effect as a fertilizer the first year, the material from lowland moors being much the more effective. In every case, however, the effect of peat was decidedly inferior to that of manure and was much slower in action. The results for the first year indicate that 2.6 parts of nitrogen in stable manure was as efficient as 100 parts of nitrogen in peat. The addition of lime increased the efficiency of the peat to an extent which made its use profitable. Somewhat better results were obtained with the peat in field experiments than in pot experiments.

On the present status of the Swedish peat industry, E. Wallgren (*K. Landtbr. Akad. Handl. och Tidskr., 48 (1909), No. 4, pp. 316–327*).—The paper discusses the development of the peat industry and the different ways in which the industry is now of importance to the country and is likely to become of still more importance in the future.

Green manuring on the better soils, Schneidewind (*Mitt. Deut. Landw. Gesell., 24 (1909), No. 16, pp. 258–260; abs. in Centbl. Bakt.* [etc.], *2. Abt. 24 (1909), No. 16–17, p. 467*).—Good results from green manuring on the fertile soils of the Lauchstädt farm near Halle with horse beans, peas, vetches, and especially yellow clover (*Medicago lupulina*) are reported. The green manure crops were grown with cereals as the nurse crop. Serradella and lupines gave good results on the calcareous Lauchstädt soils. The crops which gave the best results following the green manuring were beets, potatoes, and oats, beets being especially benefited. The best time for plowing under the green manure appeared to be late autumn just before the appearance of frosts.

Asking questions of the soil, R. Haughton (*Rural New Yorker, 69 (1910), No. 4028, pp. 21, 22, figs. 2*).—An account is here given of the use of the wire-basket method proposed by the Bureau of Soils of this Department in testing the fertilizer requirements of alfalfa on a fertile soil in Chester County, Pa. The results are thought to indicate especially the need of inoculation for alfalfa on this soil.

The soil invoice, J. H. Pettit (*Ill. Agr., 14 (1910), No. 4, pp. 9–12, fig. 1*).—This is a brief discussion based upon data relating to the fertilizing constituents contained in typical Illinois soils and the amounts removed in various crops.

Experiments on the influence of manure on black soil, A. Buichīkhīna (*Ghodīchnuĭ Otchet Ploty. Selsk. Khoz. Opuitn. Stantziĭ, 14 (1908), pp. 144–168, 191–194*).—These experiments were undertaken in view of the common belief encouraged by various experiment stations in southern Russia that it is not possible to increase yields by the application of manure on chernozem soils in regions where the rainfall does not exceed 400 to 450 mm. annually. The experiments here summarized covered 10 years with the following rotation: (1) Fallow manured with 35,000 kg. per hectare (31,150 lbs. per acre) of barnyard manure, (2) winter wheat, (3) maize, and (4) spring wheat. The manure was applied in the spring and worked in to a depth of 17 cm. (6.7 in.). The soil on which these experiments were made contained 5.8 per cent of humus, 0.28 per cent of nitrogen, and 0.13 per cent of phosphoric acid. The average annual rainfall for the period was 413.1 mm. The manuring decidedly and profitably increased the yields of the grains in the rotation.

Production and commerce in manure in Paris, R. Olry (*Jour. Agr. Prat., n. ser., 18 (1909), No. 49, pp. 753–755*).—Statistics are given of the number of horses and the production of manure by horses and other animals in and

around Paris, as well as on the use of the manure by farmers and market gardeners near the city.

It is stated that in 1907 there were 96,290 horses in the Department of the Seine, in which Paris is situated, nearly 15,000 less than in 1905. In the city of Paris there were 84,249, or 14,000 less than in 1905. From 650,000 to 700,000 metric tons of manure were produced by horses in the Department of the Seine in 1907, 260,000 tons by cattle, of which there were 28,500 head, besides a smaller amount of manure produced by sheep, of which there were 2,500 head, making the annual production of manure about 1,000,000 tons. In the Department of the Seine outside of Paris about 35,034 acres are under cultivation, requiring not less than 2,500,000 tons of manure annually. The growing demand for the manure and the diminishing supply has increased the price of fresh horse manure to about $3 per ton in Paris. The price per ton of strawy cattle manure is about half this amount.

The diminishing production of manure in Paris is ascribed to the introduction of automobiles and the increasing use of peat litter, which is much more efficient as an absorbent than straw and produces a much smaller volume of manure.

How is the deficiency of stable manure to be made up? H. Pohl-Rohrbeck (*Illus. Landw. Ztg., 29 (1909), No. 50, pp. 481, 482; abs. in Centbl. Bakt.* [etc.], *2. Abt., 25 (1909), No. 10–13, pp. 318, 319*).—This article discusses three means of making up a deficiency of stable manure, (1) by substitution of other litter for straw, (2) green manuring, and (3) the use of commercial fertilizers. While it is not believed that stable manure can be entirely dispensed with, it can be to a considerable extent replaced by green manuring and commercial fertilizers. By substitution of peat litter for straw a better manure at less cost may be obtained.

Growth of commercial fertilizers, M. A. Scovell (*Ky. Farmer, 6 (1909), No. 46, pp. 1, 2*).—The growth of the use of fertilizers in this country, and especially in Kentucky, is briefly reviewed.

Plain talks on the use of fertilizers, E. B. Voorhees (*Farmers Digest, 3 (1909), No. 6, pp. 6, 7*).—A brief discussion of sources, functions, and use.

Practicable fertilization, J. L. Hills (*Rpt. Bd. Agr.* [*N. H.*], *30 (1907–8), pp. 84–95*).—Practicable fertilization as defined and discussed in this article "is that procedure which places a unit of available plant food within reach of crop roots at the least cost." The article discusses the utilization of the plant food in the soil, subsoil, and air, as well as the purchase and use of fertilizers.

The manufacture of chemical fertilizers, J. Fritsch (*Fabrication des Engrais Chimiques. Paris, 1909, pp. 540, pls. 4, figs. 69; rev. in Rev. Gén. Chim., 12 (1909), No. 21, p. 338*).—This treatise presents a digest of the scattered information on the manufacture of fertilizers. It is divided into three parts dealing, respectively, with phosphatic, nitrogenous, and potassic fertilizers.

Fertilizer mixtures, S. F. Morse (*Country Gent., 74 (1909), No. 2969, p. 1210*).—Supplementing a previous article on the economical use of fertilizers, the author describes simple methods devised by him for calculating the amounts of materials required to make fertilizer mixtures of any desired composition.

The nitrate of soda position (*Engin. and Min. Jour., 88 (1909), No. 24, pp. 1177, 1178*).—The present status of production and prices of nitrate of soda are discussed. It is shown that following the expiration, March 31, 1909, of the agreement among nitrate producers limiting the quantity marketed each year there has been a rapid increase in production and fall in price.

The nitrate fields of Chile.—The origin, production, and uses of nitrate of soda (*Times* [*London*], *1909, Dec. 28, pp. 57, 87, figs. 3*).—An account is given of the origin, present condition, and extent of the deposits, the methods

of extracting the nitrate, cost of production, exports, and uses. The exports for 1908 exceeded 2,000,000 tons, and in June of that year there was a reserve stock of 220,000,000 tons. It is estimated that there is enough nitrate in the deposits to last at least 100 years.

[A new atmospheric nitrogen fertilizer] (*Chem. Trade Jour., 45 (1909), No. 1169, pp. 354, 364; Mark Lane Express, 102 (1909), No. 4074, p. 461*).—Serpek's process for manufacturing aluminum nitrid and utilizing it in the production of ammonia is briefly noted.

New fertilizer materials, F. S. S. Johnson (*Daily Cons. and Trade Rpts. [U. S.], 1910, No. 3676, p. 14; Mo. Cons. and Trade Rpts. [U. S.], 1910, No. 353, p. 83*).—Brief notes are given upon the utilization of a lime by-product of sugar factories and on the first shipment of calcium cyanamid from the works at Niagara Falls.

Artificial nitrates [in Norway] (*Chem. Trade Jour., 46 (1910), No. 1180, p. 9; Daily Cons. and Trade Rpts. [U. S.], 1910, No. 3689, pp. 13, 14*).—This is a brief note on the present status of the Norwegian nitrate industry, including a list of companies engaged in the manufacture of this material.

Norwegian nitrate, K. Ulrich (*Deut. Zuckerindus., 34 (1909), No. 51, Beilage 1, pp. 976, 977*).—Comparative tests of Norwegian nitrate (basic calcium nitrate) and nitrate of soda on sugar beets gave results very favorable to the former. A larger yield of sugar beets with equally high percentage of sugar and better crystallization was obtained with the Norwegian nitrate.

The new nitrogenous fertilizers in comparison with the old, G. Jacometti (*Ann. R. Accad. Agr. Torino, 51 (1908), pp. 179–208, fig. 1*).—Cooperative experiments in the province of Turin are reported, comparing the fertilizing value of sulphate of ammonia and nitrate of soda with that of calcium cyanamid and calcium nitrate. The crops were wheat (1 spring and 3 winter varieties), corn (8 varieties), permanent meadow (1 dry, 1 semiirrigated, and 2 irrigated), broom corn, mint, potatoes, and spinach. Calcium nitrate was used only in the case of 1 irrigated meadow and of mint.

The conclusions drawn are: (1) Both calcium cyanamid and calcium nitrate have a fertilizing value about equal to that of sulphate of ammonia and nitrate of soda. (2) Contrary to the results in experiments reported from other parts of Italy, in the province of Turin calcium cyanamid is slow in action, and therefore should be applied as early as possible, at the time of plowing in the case of cultivated crops, and in the winter on meadows. (3) No appreciable damage to seed, tubers, or plants was found to result from the use of calcium cyanamid in the following amounts, calculated as pounds per acre: 160 to 180 for wheat, 160 for corn, 135 to 215 for potatoes, and 180 for broom corn. (4) Calcium cyanamid in granular form is more convenient to handle than nitrate of soda.

On the use of Laming's mixture, or crude ammonia, for fertilizing or as an antiseptic, D. Cavazza (*Ann. Uffic. Prov. Agr. Bologna, 15 (1908), pp. 159–172*).—The analysis given of this material shows total moisture (air-dried substance) 21.38, ammoniacal nitrogen (in undried material) 0.48, sulphocyanid (in undried material) 0.0152, total sulphur (in dried material) 49.02, and ferriferrocyanid (in dried material) 9.55 per cent.

Experiments were made with hemp to determine (1) the effect of crude ammonia on growth; (2) whether the nitrogen of crude ammonia is assimilable, wholly or in part; (3) what influence the interval between the sowing and the fertilization has on the result.

The crude ammonia was mixed with an equal amount of gypsum and in each experiment there was a control plat with gypsum alone, as well as a plat without fertilizer. The first experiment was on a clayey soil, well supplied with lime; the use of crude ammonia showed a negative result as compared

with sulphate of ammonia and also with gypsum alone. In the second experiment, on sandy soil, the crude ammonia showed a positive action greater when applied in the fall than in the spring. In the third experiment, on clayey-sandy soil, the crude ammonia showed a decided advantage over sulphate of ammonia, as did also the gypsum, the gypsum being superior to the crude ammonia. In an experiment with wheat the crude ammonia was superior to nitrate of soda and to gypsum but all were inferior to no fertilization.

The conclusion is drawn that crude ammonia is used to better advantage on poor soils.

On the fertilizer value of so-called nitrammon-lime (poudrette), H. G. SÖDERBAUM (*K. Landtbr. Akad. Handl. och Tidskr., 48 (1909), No. 5, pp. 442–459, figs. 5; Meddel. Centralanst. Försöksr. Jordbruksomradet, No. 17, pp. 20, figs. 5*).—This material is manufactured in Swedish cities by treatment of the night soil with quicklime. The analyses given range from 19.2 to 30.5 per cent moisture, 0.53 to 1.36 per cent phosphoric acid, 36.29 to 47.4 per cent lime, 0.25 to 0.68 per cent potash, 0.25 to 0.5 per cent total nitrogen, and 0.007 to 0.08 per cent ammonia.

Fertilizer trials were made with the poudrette on oats grown in glass cylinders which were filled with a sandy soil very low in nitrogen and phosphoric acid. The results showed that the fertilizer effect of the poudrette is dependent primarily on its lime content. The potash proved of some benefit, but the phosphoric acid, being present in the form of triphosphate, was but slightly available. Neither the nitrogen in the poudrette nor its organic substance appeared to affect appreciably the yields secured, a result that is quite contrary to the claims made for the fertilizer by the manufacturers.

A better method of use of nitrate of soda, L. DECAUX (*Engrais, 24 (1909), No. 51, pp. 1419–1423*).—In experiments with sugar beets and fodder beets the best results were obtained by applying the nitrate in one application before planting and thoroughly mixing it with the soil.

Observations on the assimilation of potash and nitrogen by fodder beets after fertilizing with manure and commercial fertilizer, A. STUTZER (*Mitt. Deut. Landw. Gesell., 24 (1909), No. 50, pp. 738, 739*).—Experiments with fodder beets gave results confirming the conclusion of Schneidewind (E. S. R., 16, p. 454) that the assimilation of potash and nitrogen is largely increased by adding nitrate of soda to stable manure in the fertilizing of beets.

The occurrence of ammonia and nitrate in deposits of potash salts, W. BILTZ (*Ztschr. Anorgan. Chem., 64 (1909), No. 2, pp. 215, 216; abs. in Chem. Ztg., 33 (1909), No. 138, Repert., p. 591*).—Analyses of a sample of potash salt from the Schönebeck deposits are reported, showing the presence of considerable amounts of ammonia and nitrate. The amount of ammonia, 0.05 per cent, was practically the same as that found in recent examinations of sea water. The figures for ammonia in sea water given in a previous paper (E. S. R., 21, p. 721) were based upon old analyses and are believed to be much too high.

A new potash fertilizer, L. HAUMONT (*Jour. Soc. Agr. Brabant et Hainaut, 54 (1909), No. 51, pp. 1196, 1197*).—This article describes and gives the results of various experiments which have been made with phonolite (lava meal), including those of Wagner, Hiltner (E. S. R., 20, p. 1022; 22, p. 324), and the German Agricultural Society, all showing the decided inferiority of the phonolite as compared with ordinary potash salts.

Will potash be cheaper? (*Amer. Agr., 84 (1909), No. 24, pp. 592, 593*).—It is thought that following the disruption of the potash syndicate in Germany and the acquisition of control of certain of the German mines by American interests the prospects for lower prices for potash are good.

Relation of phosphorus to permanent American agriculture, J. E. WHITCHURCH (*Ill. Agr., 14 (1910), No. 4, pp. 22–25*).—The widespread need of phosphates for the improvement of soils and the consequent importance of conserving the phosphate deposits of the country are discussed.

Acid phosphate, C. C. JAMES (*Hawaii. Forester and Agr., 6 (1909), No. 11, pp. 419–422*).—The apparatus and methods employed in the manufacture of acid phosphate are described as well as the chemical changes which the phosphate undergoes in the process of manufacture and in storage.

The use of fertilizer lime, R. W. THATCHER (*Washington Sta. Popular Bul. 19, pp. 4*).—A popular edition of Bulletin 88 previously noted (E. S. R., 21, pp. 224, 291).

Concerning the influence of various relations between lime and magnesia on the development of plants, II, L. BERNARDINI and A. SINISCALCHI (*Ann. R. Scuola Sup. Agr. Portici, 2. ser., 8 (1908), pp. 19*).—This is a continuation of work previously noted (E. S. R., 20, p. 728). The study here reported had in view: (1) To determine what influence was exercised by the relation between lime and magnesia upon the assimilation of phosphoric acid by the plant; (2) to determine if an antagonism between lime and magnesia exists in the vegetable organism.

In the first series the cultures were made in a nutritive solution, with plants of wheat, barley, and corn, germinated in pure quartz sand. The nutritive solution contained, per 1,000 cc., 0.5 gm. disodium phosphate, 0.5 gm. potassium sulphate, and 0.001 gm. iron chlorid. In addition each flask received per 1,000 cc. of solution such a quantity of calcium nitrate and of magnesium nitrate that, while the quantity of the anion NO_3 remained constant at 0.457 gm., the ratios of lime to magnesia were 4 : 1, 2.5 : 1, 1 : 1, 1 : 2.5, and 1 : 4. The conclusion is drawn that the assimilation of phosphoric acid is dependent upon the ratio of lime to magnesia; increasing this ratio decreases the phosphoric acid assimilated, and conversely, decreasing the ratio increases the phosphoric acid assimilated.

In the second series lupines were used in pot cultures. The conclusion is drawn that the injurious action produced by an excess of lime and the poisonous action of an excess of magnesia in the soil is not due to the absolute quantity of the ions Ca and Mg absorbed by the plant but to the ratio in which they are absorbed, and hence that with the appropriate application of the salts of calcium and magnesium it will be possible to correct the poisonous effects on plants of an excess of magnesia or of lime existing in the soil.

On the various correlations between lime and magnesia in the nutritive solution, I. KONOVALOV (*Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 10 (1909), No. 3, pp. 303–320; abs. Chem. Abs., 3 (1909), No. 24, p. 2991*).—The experiments here reported were a continuation of earlier work (E. S. R., 19, p. 827) and similar methods were used.

The results of the water and sand cultures with wheat, lupines, *Setaria italica*, and oats confirmed in general the results of the previous experiments. The growth of the plants was injuriously affected when magnesia was present but lime absent in the nutrient solution, and the yield increased with the increase of the proportion of lime to magnesia. The results did not confirm Loew's view that there is a definite lime-magnesia ratio for each plant.

Manganese fertilizers, H. ROUSSET (*Ann. Sci. Agron., 3. ser., 4 (1909), II, No. 2, pp. 81–111*).—This is a summary of investigations relating to the occurrence of manganese in nature; the physiological rôle of manganese; the earlier Japanese experiments with manganese as a fertilizer, particularly for rice; manganese fertilizers for other cereals, sugar beets, potatoes, and miscellaneous

crops; the mechanism of the action of manganese fertilizers; and the practical use of manganese fertilizers. The author concludes that the status of the value of such fertilizers is still unsettled.

Experiments on the fertilizing action of the crystalline residue of tobacco, G. CARUSO (*Atti R. Accad. Econ. Agr. Georg. Firenze, 5. ser., 6 (1909), No. 2, pp. 215–218*).—The composition of the crystalline residue of tobacco used in the experiments was as follows: Water 22, organic nitrogen 1.3, ammoniacal nitrogen 0.55, nitric nitrogen 3, and potash 19.65 per cent. This material was compared with nitrate of soda and sulphate of ammonia as a source of nitrogen for wheat, all three being applied at the rate of 18 lbs. of nitrogen per acre. It was found that the residue was only a little inferior to nitrate of soda and sulphate of ammonia. At a price one-third less than nitrate of soda, the author considers that it would be an economical and convenient source of nitrogen.

Bat guano in Burma, E. THOMPSTONE (*Agr. Jour. India, 4 (1909), No. 4, pp. 379–381*).—Descriptions and analyses are given of a number of samples of bat guano collected from limestone caves in different parts of Burma. The material is shown to be very variable in composition. The richest sample examined contained 2.13 per cent of phosphoric acid and 7.97 per cent of nitrogen. The agricultural value of the fertilizer is briefly noted.

Sawdust for use as litter, E. KINCH (*Agr. Students' Gaz., n. ser., 14 (1909), No. 5, pp. 167, 168*).—Determinations of nitrogen and mineral matter in sawdust from oak, elm, ash, spruce, larch, and red pine are reported. The results show from 0.14 to 0.3 per cent of nitrogen and from 0.25 to 1.38 per cent of mineral matter in the dry matter. Assuming 10 per cent of moisture, the nitrogen content is 0.2 per cent.

Report of analyses of commercial fertilizers and Paris green, J. E. HALLIGAN (*Louisiana Stas. Fert. Rpt. 1908–9, pp. 122*).—The results of examinations of 5,638 samples of fertilizing materials and 5 samples of Paris green examined during the year 1908–9 are reported. Of the 2,523 samples of complete fertilizers examined 1,470 were equal to or above the guaranty in all 3 fertilizing constituents. The constituent most frequently deficient was nitrogen and least frequently potash.

Report of analyses of samples of fertilizers collected by the commissioner of agriculture during 1909 (*New York State Sta. Bul. 318, pp. 293–381*).—This bulletin reports the results of analyses of samples of fertilizers collected by the commissioner of agriculture of New York during 1909 and analyzed in the laboratory of the New York State Station.

Analyses of commercial fertilizers, B. L. HARTWELL ET AL. (*Rhode Island Sta. Bul. 137, pp. 3–11*).—"This bulletin contains the analyses of the samples of commercial fertilizers which represented principally the brands offered for sale during the spring of 1909 as potato manures. It also includes the analyses of the samples of bones and tankage." Analyses and valuations of 59 samples of fertilizers are given in tables.

AGRICULTURAL BOTANY.

The fixation of bud mutation of Solanum maglia, E. HECKEL (*Compt. Rend. Acad. Sci. [Paris], 149 (1909), No. 20, pp. 831–833*).—The author describes a bud mutation of *S. maglia* that has become established during 4 generations of cultivation. The characters of the plant and the appearance of the tubers have been constant and there does not seem to have been any reversion since the third generation.

In this connection the author discusses the subject of the origin of the cultivated potato. He thinks that probably *S. commersonii*, which occurs on the east

coast of South America, and *S. maglia*, on the west side of the continent, have had some part to play in its origin.

Notes are given on the variation in form and color of some of the mutants of *S. maglia* and *S. commersonii.*

A recent example of mutation in Solanum commersonii, L. PLANCHON (*Jour. Agr. Prat., n. ser., 18* (*1909*), *No. 47, pp. 694, 695*).—The author states that for a number of years he has been growing *S. commersonii* of the well-known wild type, and that in 1908 a mutation was observed. Nothing out of the ordinary was noted in the aerial parts of the plants, but when the tubers were dug they showed some marked differences and were readily divided into two groups, one closely resembling the common wild type, while the other was considerably increased in size, of a yellowish color, with smooth skins, and with some of the specimens weighing as much as 234 gm.

These tubers were planted in 1909, and while some reverted to the ancestral type, others perpetuated the mutation, and on these the stems were shorter, more erect, of a pale color; the leaves were larger, of a greenish-yellow color; the flower characters were quite different from the wild type; and the tubers persisted in the form described above. In the wild type the rhizome character was maintained, but this was completely lost in the new forms. The general appearance of the tubers is said to have resembled very much those of the common Early Rose.

The origin of the cultivated potato, L. WITTMACK (*Landw. Jahrb., 38* (*1909*), *Ergänzungsb. 5, pp. 551–605, pls. 2, figs. 16; Ber. Deut. Bot. Gesell., 27* (*1909*), *Gen. Versamml. Heft 1, pp. 28–42, figs. 6*).—Studies have been made of the various species which have been claimed to be the original of the cultivated potato.

Upon the basis of flower and other characters the author divides the species of Solanum into 4 groups, and many of the so-called species he considers synonyms or hybrids of other well-differentiated species. He believes that *S. tuberosum* is a good species and *S. etuberosum* probably a hybrid. The varieties of potatoes in common cultivation are believed to have been mostly developed from *S. tuberosum. S. maglia* may have contributed a little to their origin, but *S. commersonii* is thought to be in no way associated with the forms now in cultivation.

The ferments and latent life of resting seeds, JEAN WHITE (*Proc. Roy. Soc.* [*Lodon*], *Ser. B, 81* (*1909*), *No. B 550, pp. 417–442*).—The author has made a study of seeds of cereals to determine the effect of age on the germinating power, the relation, if any, between the age of the seeds and the persistence of their enzyms with reference to the correlation between germinating power and enzyms, and the effect of extreme temperatures on germinative ability and enzym reaction. The experiments were carried on with wheat, barely, oats, maize, and rye of known age, from 6 months to 21 years.

There was found to be a well-marked drop in the germinating power of seeds after the fourth year, and in the case of wheat it descended more or less irregularly, reaching zero in 11 to 17 years, according to the conditions of storage.

The resting seeds of cereals were all found to contain diastatic, fibrin-digesting, and ereptic ferments in appreciable quantities. These ferments retained their activity without appreciable change in dry stored seeds for 20 years or more, or for a considerable time after the germinating power had been lost.

No relation was noted between the vitality of seeds and the persistence of enzyms in them, and the question as to whether germination can take place in the absence of enzyms remains to be answered.

Two days' exposure to liquid air did not destroy any of the seeds tested, nor did it appreciably affect the ferments in any of the cereals. The dry diastase of barley was found to be able to withstand a range of temperature from —200° to +130° C.

Many seeds, including all cereals, were found to give off appreciable quantities of carbon dioxid when stored in air-dried condition, but some showed no signs of respiration whatever. The respiration of air-dried wheat was found especially pronounced. In practically every case respiration ceased when the seeds had become moderately dried, although in the case of large seeds like maize minute traces of carbon dioxid could be found for some time.

The preservation of diastases in seeds destroyed by anesthetics, J. APSIT and E. GAIN (*Compt. Rend. Acad. Sci.* [*Paris*], *149* (*1909*), *No. 1, pp. 58–60*).—The authors report that wheat, the germination of which had been destroyed by sulphuric ether, still retained its amylase and peroxidase.

Differences of susceptibility of plants to stimulation, T. TAKEUCHI (*Jour. Col. Agr. Imp. Univ. Tokyo, 1* (*1909*), *No. 2, pp. 207–210*).—Experiments are described in which spinach, peas, barley, and flax were grown in soil cultures receiving 0.2 gm. of manganese sulphate in the form of a dilute solution. The results obtained showed that the different species were not equally stimulated by manganese under the same conditions. The leguminous and cruciferous plants seemed to be much more susceptible than were the grasses, barley being the least stimulated of the species investigated.

The influence of ultraviolet rays on the vegetation of plants, L. MAQUENNE and E. DEMOUSSY (*Compt. Rend. Acad. Sci.* [*Paris*], *149* (*1909*), *Nos. 19, pp. 756–760; 22, pp. 957–961*).—A review is given of some of the observations of the different investigators relating to the effect of artificial light, and particularly of electric light, on the growth of plants.

The authors state that the action of the ultraviolet rays is for the most part superficial, penetrating but little into the plant tissues. These rays destroy the cells very speedily and the blackening of the leaves and other changes in the color of the plants when exposed to the direct light of an arc lamp are due to the predominance in that light of the ultraviolet rays. As a result of these rays the protoplasm is destroyed.

In a subsequent article the authors report investigations in which they sought to explain the reasons for the blackening of green leaves. Their conclusions confirm those noted above that the ultraviolet rays injure the epidermal cells of the leaf, but the blackening of the leaves is not considered due to the specific action of the light rays. A similar effect it was found could be produced by anything that would destroy the protoplasm or cell contents, such as heat, chloroform, mechanical injury, etc. The blackening is held to be a result of diastatic action, and brought about by the liberation of the diastase which in the normal state is confined to certain distinct cells in the interior of the leaf.

Sap pressure in the birch stem, H. E. MERWIN and H. LYON (*Bot. Gaz., 48* (*1909*), *No. 6, pp. 442–458, dgms. 5*).—During the seasons of 1902 to 1904 sap pressure observations were made on several kinds of trees, birches and maples illustrating the two extreme types of sap pressure phenomena. The authors' observations on the maples are in accord with those previously described from the Vermont Station (E. S. R., 15, p. 853). The observations on the sap pressure of the birch stem are described at length.

The influence of anesthetics and freezing on certain plants, E. HECKEL (*Compt. Rend. Acad. Sci.* [*Paris*], *149* (*1909*), *No. 20, pp. 829–831*).—The effect of freezing and various anesthetics on a number of plants that contain coumarin is described. Among the plants are *Anthoxanthum odoratum*, *Liatris odora-*

tissima, *L. spicata*, *Angraecum fragrans*, and *Melilotus officinalis*, in which coumarin occurs alone or in combination with other substances.

The experiments show that both anesthetics and freezing liberate the coumarin very rapidly and that the characteristic odor from frozen green plants can be recognized in a few moments where ordinarily it is not apparent until after the plants have become more or less dried.

On the presence of two new glucosids in Primula officinalis, A. GORIS and M. MASCRÉ (*Compt. Rend. Acad. Sci. [Paris], 149 (1909), No. 21, pp. 947–950*).—The authors state that fresh roots of primulas which have been frozen give off more or less rapidly a substance having the odor of anise. This fact led to the investigation of related species, and it was found that a species of Primula could be divided into three groups, depending on the odor given off after freezing.

A study was made of *P. officinalis* to determine the reason for the liberation of this odor, and the authors found two glucosids, primeverine and primulaverine, present, together with an enzym, primeverase.

The occurrence of rennets in the Basidiomycetes, C. GERBER (*Compt. Rend. Acad. Sci. [Paris], 149 (1909), No. 21, pp. 944–947*).—A study was made of 86 species of Basidiomycetes to determine the relative activity of the rennet in the fresh juice of these fleshy fungi, comparisons being made with the rennet extracted from *Amanita citrina*. Many of the species, particularly those of Trametes, Polyporus, Tricholoma, etc., contained rennet which is as active as that of the higher vegetable rennets or the animal rennets, while, on the other hand, many contained this substance in very small quantity.

Marked differences were found to occur in the coagulating power of rennet obtained from different species of the same genus of mushrooms, and in the case of the agarics and Gasteromycetes the most active rennet was obtained from the hymenial portion of the fungus.

The author divides the rennets obtained from the Basidiomycetes into two groups based upon their resistance to temperature.

The rôle of nitrogen and its compounds in plant metabolism, J. M. PETRIE (*Proc. Linn. Soc. N. S. Wales, 33 (1908), pt. 4, pp. 801–844*).—After a historical review of literature relating to this subject, in which more than 100 articles are referred to, an account is given of the author's studies of the nonprotein nitrogen in seeds. A discussion is presented of the various methods employed for the precipitation of protein, after which the results are given of a study of the seeds of 30 species of plants, in which the protein that is not precipitated by alcohol was determined. It appears that from 12 to 33 per cent of the nitrogen in seeds occurs in forms that are not precipitated by alcohol, and these figures are believed to represent the minimum proportions.

In a special study of the seeds of *Acacia pycnantha* the author found 45 per cent of the nitrogen to be nonprotein nitrogen, and he believes that the importance of this form of nitrogen in the economy of the plant has been underestimated.

Studies of the carbohydrates in seeds, E. SCHULZE and C. GODET (*Ztschr. Physiol. Chem., 61 (1909), No. 4–5, pp. 279–351; abs. in Jour. Chem. Soc. [London], 96 (1909), No. 564, II, pp. 824, 825*).—An investigation was made to determine the nature of the carbohydrates present in the seeds of a large number of plants. The studies were made of the decorticated seed and of the seed coats.

In about one dozen representative species no pentoses or hexoses were present in the ungerminated seeds. Sucrose was detected in nearly every one of the 27 species examined, white and blue lupines alone giving negative results, and

it is thought that this might have been due to the small quantities present. Soluble carbohydrates, most of which yield mucic acid upon oxidation, were commonly present, and in the case of a few seeds they were determined, raffinose being isolated from wheat and lupeose from yellow and blue lupines. Pentosans were not found to occur to a greater extent than 1 per cent in any case, and in many seeds none at all was isolated.

The presence of soluble carbohydrates in many seeds is believed to indicate that they are particularly suitable for the nutrition of the young plant, as there can be little doubt that these serve as reserve materials and are broken down into simpler sugars during germination. Insoluble carbohydrates, such as starches, celluloses, and hemicelluloses, were found present in the decorticated seeds. Studies of the seed coats showed very small quantities of soluble carbohydrates. They appear to be composed mainly of nitrogen-free substances, of which hemicelluloses are present in considerable quantities. The rest of the seed coats consisted of cellulose, wood gum, lignin, and various indefinite substances.

Phosphoric acid in leaves of plants, J. Seissl (*Ztschr. Landw. Versuchsw. Österr., 12 (1909), No. 4, pp. 157–167; abs. in Jour. Chem. Soc.* [*London*], *96* (*1909*), *No. 564, II, p. 824*).—An investigation has been made on the occurrence of phosphoric acid in the leaves of various plants at different stages of growth, the total phosphorus being estimated together with the proportion of phosphorus which is present in organic combinations. It was found that as a rule the phosphorus content of the leaves reached its maximum at the period of greatest growth, after which there was a steady decrease until autumn. In the case of the maple the total phosphorus reached its maximum content in August. Red leaves were found to contain less phosphorus than green ones from the same plant.

The nature of chlorophyll (*Gard. Chron., 3. ser., 46* (*1909*), *No. 1197, p. 380*).—A summary is given of some observations by Willstätter on the nature of chlorophyll, in which it is shown that a certain proportion of magnesium is always present in the chlorophyll molecule, and that the work of chlorophyll in forming starch and sugar from carbon dioxid and water is in some way connected with the magnesium which it contains. The observations have shown that magnesium is a constant component of chlorophyll derived from plants of every class, and in the form of magnesium oxid it has been obtained to the extent of 6 per cent when the chlorophyll was burnt to ash. It is stated that the reason why the presence of magnesium in chlorophyll has not been previously demonstrated is due to the fact that acids have been usually employed in the preparation of pure chlorophyll. If alkalis are used it is possible to obtain from chlorophyll well-crystallized products that are magnesium salts of carboxylic acids.

The influence of spraying or dusting with fungicides or fertilizing materials on the growth of plants, L. Hiltner (*Prakt. Bl. Pflanzenbau u. Schutz, n. ser., 7* (*1909*), *Nos. 2, pp. 17–22, fig. 1; 3, pp. 29–33; 5, pp. 65–69*).—On account of the extensive use of fungicides and insecticides the author has studied their effect on plant growth, comparing some of the substances used as fungicides as well as a number of others which are applied as fertilizers.

In a series of experiments with plants sensitive to lime it was found that spraying such plants as lupines with iron sulphate solution was decidedly beneficial to their growth when grown in lime soils. The same was true of peas and vetches, and particularly so of *Lathyrus sylvestris*, which was much greener after the spraying and made better growth. Lupine plants that had become green after spraying with iron sulphate solution again became chlo-

rotic when sprayed with milk of lime. Grasses were not permanently injured when sprayed with 2 to 5 per cent solutions of iron sulphate.

In another series of experiments the effect of spraying with 0.5 to 15 per cent iron sulphate solutions on plants that had been rather strongly fertilized with lime niter was tested. Even where the smallest amount of iron sulphate was used there was some injury to potatoes and it is believed that the superabundant lime in the lime niter was in part responsible for this injury. The sensitiveness of mustard to iron sulphate is believed to be due to the stimulating effect of the nitrogen in the fertilizer, causing a much more tender growth of the mustard plants.

Spraying oat fields for the destruction of wild mustard, in which a 20 per cent solution of iron sulphate was used, was without injurious effect to the oat plants.

Experiments in spraying potatoes with 2 to 4 per cent solutions of lime nitrogen, kainit, sulphate of magnesia, iron sulphate, milk of lime, humus, Bordeaux mixture, and a copper-humus mixture were made to determine the relative efficiency of the different mixtures in preventing the leaf curl disease as well as the possibility of correcting the lime-magnesia ratio by applying fertilizers in this manner. On the variety of potatoes especially subject to disease the yield was increased by all the treatments, except where iron sulphate or milk of lime was used. Where Bordeaux mixture and the humus-copper mixture were compared the highest yield was secured from the plat receiving the humus mixture.

Other experiments were conducted in the spraying of oats, peas, horse beans, lupines, serradella, mustard, and potatoes grown on soils poor in lime, in which applications were made of 2 per cent solutions of gypsum, 4 per cent milk of lime, 1 per cent sulphate of magnesia, 1.5 per cent iron sulphate, and 2 per cent humus. Spraying with gypsum was unfavorable in every case except with oats. The plats of serradella, mustard, and potatoes sprayed with sulphate of magnesia gave maximum yields, while peas, horse beans, and lupines when given applications of humus produced the highest yields.

In conclusion the author states that the yields of all the crops experimented with were increased by spraying and the plants were made more resistant to disease.

The action of different amounts of copper in the soil on the growth of plants. J. SIMON (*Landw. Vers. Stat., 71 (1909), No. 6, pp. 417–420*).—Pot experiments with oats and mustard grown on garden soil, clay, and pure sand containing amounts of copper sulphate varying from 0.01 to 10 per cent are reported. The oat plant was shown to be more resistant to copper sulphate in the soil than mustard, and in general the resistance of the plants was greater the less the absorptive power of the soil for copper sulphate. With the same concentration, injury from the sulphate was least in the garden soil and greatest in the pure sand.

Experiments with Reflorit. F. MACH (*Ber. Landw. Vers. Anst. Augustenb., 1907, pp. 20, 28–30*).—Reflorit is stated to be essentially a picrate of lime, the sample used in the experiments here reported containing 16.43 per cent of nitrogen.

Tests of the material on various fungi and on maize, as well as in the treatment of plant lice on grapes, showed that under certain conditions and dilutions the Reflorit stimulated the growth of molds and was utilized to a slight extent as a source of nitrogen by corn. A 0.05 per cent solution, however, injured the roots of corn. A solution containing 1 part of Reflorit to 600 of water produced no effect on plant lice. The author concludes in general that the material can not be expected to give the remarkable results claimed for it.

FIELD CROPS.

Report on the agricultural stations in the Central Provinces for the year 1908–9 ending June 30, 1909, R. G. ALLAN, D. CLOUSTON, and G. EVANS (*Rpt. Agr. Stas. Cent. Prov. [India], 1908–9, pp. 51*).—A brief history of the farms and of the work of the agricultural stations at Nagpur, Raipur, Akola, Hoshangabad, and at the Telinkheri Seed Farm, is given, together with meteorological data and descriptions of the soil at each station.

At Nagpur, experiments to determine the residual value of fertilization gave results favoring cattle manure, bone dust, saltpeter, and green manure. Experiments covering a 5-year period with cotton, sorghum, and pigeon peas, showed a greater increase of yield from the application of 40 lbs. of nitrogen per acre in barnyard manure, than from the same amount supplied in night soil, bone dust, saltpeter, or in a combination of bone dust and saltpeter. A similar experiment on sorghum with a subordinate crop of pigeon peas gave variable and indecisive results. In a 3-year test with cotton of nitrate of soda, superphosphate and sulphate of potash, singly and in combination, every combination containing nitrate of soda produced a decisive increase of yield, while each of the others applied singly produced a decrease of yield as compared with the check plat. In a 3-year test to determine the relative value of the solid and liquid manure of bullocks, the solid produced a larger increase in yield of wheat than did the liquid, while a still larger increase was secured from the application of both. In case of sorghum, the liquid manure alone produced the largest increase. On fiber crops superphosphate increased the yield of fiber, but not to a sufficient extent to render the application profitable. In a test of dry crop rotations with wheat as a principal crop, the greatest profit arose from alternating wheat and chickling vetch.

Other work reported indicates the value of the cotton, pigeon pea, and sesamum rotation, of plowing with the Swedish plow as compared with the native methods, of 10 lbs. per acre as the rate of seeding and 3 in. as the proper spacing for flaxseed, of the application of soluble nitrogenous fertilizers in conjunction with cattle manure for a jute crop, and of 12 irrigations and mulching after sowing this crop. Varieties of crops grown and trials of new implements are also reported.

At the Raipur Station, night soil after the meagher system, applied in April every third year, produced profits and yields of paddy one and one-half to three times as great as any other fertilizer except on the irrigated plats, where all applications gave very high and profitable returns. Wheat and gram proved almost equally profitable, but less profitable if sown together. The local groundnut excelled, in both quantity and size of nuts, 5 other varieties tested. Variety and manurial tests of sugar cane and selection of 3 varieties of rice were undertaken. Greater returns were secured from land plowed by a turnwrest plow than from that plowed with the country plow or bakhared (harrowed).

At Akola, results with experiments in rotation and in topping cotton are as yet indecisive or negative. The best tillage results were obtained on plats plowed with the native plow and bakhared or harrowed. The Berar Jari and Buri cottons produced the largest and most valuable yields of lint. Fertilizers were applied to cotton at an economic loss, but with profit when combined with cattle manure. Liquid cattle manure on sorghum produced yields nearly twice as profitable as were secured from solid manure or solid and liquid combined. The liquid manure was conserved by using 5 or 6 in. of dried earth in the stall, thereby doubling the amount collected. In a water-logged soil planting cotton on ridges proved profitable.

At Hoshangabad, saltpeter gave the best results in a test of the manurial requirements of wheat under irrigation. Barnyard manure showed little advantage on unirrigated plats of wheat. A wheat-gram-wheat rotation proved the most profitable of the wheat series, continuous cropping with wheat being only slightly less profitable. Sowing in drills and at the rate of 120 lbs. per acre, gave the best results. Plowing with a deep iron plow proved superior to other methods. Ammonium sulphate gave the maximum results with hay and cotton.

Annual report of the Lyallpur Agricultural Station for the kharif and rabi seasons, 1908–9 (*Ann. Rpt. Lyallpur Agr. Sta., 1908–9, pp. 14+XXIX*).—Work briefly reported is that with methods of cultivation, handling and marketing of cotton and jute, tests of Australian, indigenous, macaroni, common, punjab, bearded and beardless common wheats, barley, gram, oats, cassava, mulberry trees, figs, and silkworms.

Calcium nitrate applied to wheat at the rates of 100 lbs. and 150 lbs. per acre produced increases in yield of 36 per cent and 20 per cent, respectively. In another experiment the percentages of increase were 33 and 21 per cent, respectively. On sugar cane the same fertilizer produced a markedly greater increase in yield and in percentage of juice and gur, than did crude nitrate when applied at the rate of 65 lbs. of nitrogen per acre. In a 12-year rotation experiment the yield of maize in 1908 cultivated with the deep plow was from 2 to 11 times as great as that obtained with the desi plow.

Report on the agricultural station, Orai, Jalaun, of the United Provinces of Agra and Oudh, June 30, 1909 (*Rpt. Agr. Sta. Orai, Jalaun [India], 1909, pp. 17, maps 4*).—Variety tests were conducted with wheat, sorghum, cotton, and peanuts, together with tests of cultural methods, utilization of waste land for spineless cactus, common blue Agave, *Prosopis juliflora*, and *Melilotus officinalis*, methods of eradication of weeds, soil analyses, and tests of barnyard manure and night soil. In a 3-year test of 5 varieties, the Virginia peanut proved the best. The possibility of the successful establishment of date plantations is regarded as demonstrated. Meteorological data and notes on insect pests are also given.

Report of the experiment field of the Krasno-ufimsk Trade School for 1907, L. Lyevochkin (*Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 10 (1909), No. 3, pp. 376–379*).—Fertilizer and variety tests are reported.

Report on the Cawnpore Agricultural Station in the United Provinces, June 30, 1909 (*Rpt. Cawnpore [India] Agr. Sta., 1909, pp. 45+84, dgm. 1*).—This report contains, in addition to the work with field crops, meteorological and soil data pertaining to the locality of the station, and notes on insect and other pests, implements, and new plants of the year.

In experiments with sulphate of ammonia, superphosphate, and farmyard manure applied separately and in combination, the first named fertilizer produced the greatest increase in yield of lint cotton and in lint percentage, superphosphate apparently producing a decrease in each. A comparison of nitrate of lime and cyanamid applied as top-dressing on land already rich from applications of farmyard manure showed an average increase in yield of 2,100 lbs. per acre of sugar cane from the former and 470 lbs. from the latter, and an increased percentage of juice of about 1.5 per cent in each case. On the wheat plats during the seasons of 1908 and 1909 nitrate of lime apparently produced an average increase in yield of 370 lbs. of grain, while the cyanamid appeared to produce a decrease at the rate of 5 lbs. per acre as compared with the untreated plats. Fertilizer experiments on potatoes for the period 1904–1909 showed average increases per acre at the rate of 5,950 lbs. from neem cake, 4,293 lbs. from night soil, and 4,298 lbs. from cotton refuse. Contradictory

results were obtained from the use of sugar refuse, or filter press mud. Khurti proved a better green manure crop for wheat than hemp or urd. Notes are also given on the selection of arhar, poppies, wheat, American cotton, nitrogen and tillage investigations.

Report of the cooperative fertilizer and variety tests in Dalarne and Norrland, 1908, S. RHODIN (*Meddel. Centralanst. Försöksv. Jordbruksområdet, No. 16, pp. 115*).—Reports are given of 77 fertilizer experiments with oats, barley, oat hay, potatoes, mangels, grass land, soil inoculation, and nitragin, and of 111 variety tests with oats and oat hay, barley, peas, soiling crops, potatoes, and mangels, as conducted in the Swedish counties.

[Work at the Fiji experiment stations], C. H. KNOWLES (*Rpt. Agr. Fiji, 1908, pp. 1-27*).—This paper reports results of the work at the Nasinu and Lautoka experiment stations, dealing with grain, fodder, forage, fiber, and miscellaneous crops including various spices, coffee, cocoa, and rubber. Notes are also given on insect pests and the results of manurial experiments on cocoanut trees.

Influence of autumn plowing on the humidity of the soil, K. G. MANKOVSKI (*Yuzh. Ross. Selsk. Khoz. Ghaz., 1908, No. 37; abs. in Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 10 (1909), No. 3, p. 379*).—Observations on the Poltava Experiment Field indicate that plowing in the fall not only does not promote a better penetration into and retention by the soil of the winter precipitations but, on the contrary, very frequently hinders penetration.

Fallow culture according to data of the Poltava Experiment Field, K. G. MANKOVSKI (*Selsk. Khoz. i Lyesov., 1908, Dec.; abs. in Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 10 (1909), No. 3, pp. 384-387*).—This article reports tests of black fallow and of early (April), middle (May), and late (June) green fallow, on forest and clay soils overrun by weeds and in poor condition as received from peasants. The crops used were rye and wheat.

During the 8-year period 1886-1893 the black fallow was not inferior to May fallow with full manurial fertilization, but during the succeeding 8-year period the yields on the black fallow failed greatly and became less than either the manured or unmanured May fallow. Continuous forcing of the activity of the soil by fallow cultivation of the same field in 3 course rotations, led to impoverishment of the content of humus, nitrogen, phosphoric acid, mineral substances soluble in hydrochloric acid, and fine earth. Early green fallow gave better results than either middle or late green fallow, as shown by the average yields for the 12-year period 1895-1906.

Grass and clover seed production and handling in Denmark, Great Britain and Ireland, HOLLMANN and SKALWEIT (*Ber. Land. u. Forstw. Auslande, 1909, No. 20, pp. 52*).—A general review of seed production and marketing in Denmark, Great Britain and Ireland is given, together with notes on the principal grasses and clovers the seeds of which are of commercial importance in these countries, and data in regard to plant breeding, purity, germination, and other tests, including an experiment in Denmark with superphosphate and Chile saltpeter, in which 250 lbs. of 18 per cent superphosphate produced a net profit of $5.60 per acre greater than the unfertilized plat, while with a mixture of 250 lbs. of 18 per cent superphosphate and 100 lbs. of Chile saltpeter the increased net profit was $14.05 per acre. The crop used in the test was cocksfoot (*Dactylis glomerata*).

The yearly production of grass and clover seed in Denmark is given as approximately 17,500,000 lbs., of which 15,000,000 lbs. is exported.

Growing clover for seed and forage in northern Wisconsin, R. A. MOORE and E. J. DELWICHE (*Wisconsin Sta. Bul. 183, pp. 3-14, figs. 3*).—This bulletin discusses clover and its adaptation to Wisconsin conditions. Methods of seed

testing, seeding, growing, curing, and harvesting, for seed and for hay, are outlined, especially with regard to conditions on new land and on sandy and clay soils.

An average yield of 1.84 bushels per acre was secured on the 83,288 acres devoted to clover seed production in Wisconsin in 1905, whereas in 1908 the average yield of clover seed on 13 northern Wisconsin farms cooperating with the station was 2.75 bushels per acre. The average yield of alsike clover secured on clay soil was 3.96 bu., and on sandy soil 1.78 bushels per acre, while medium red clover yielded 1 bushel per acre on clay soil and 1⅓ bushels on sandy soil, and mammoth red clover yielded in the only case reported 1 bushel per acre on sandy soil.

It is advised that the biennial clovers be either pastured until about June 10, or clipped about that time or cut for hay when about one-half of the plants are in bloom, the first crop never being allowed to attain its full growth. Alsike and mammoth red should usually be left unclipped.

A comparison of early and late cutting at the 3 northern substation farms showed an average difference in favor of late cutting of 1.5 tons of hay and 0.4 bu. of clover seed per acre, although there was a loss from late cutting of 0.2 bu. of seed per acre at Iron River.

On the yields of alfalfa with varying numbers of cuttings during the season, P. Hansen (*Tidsskr. Landbr. Planteavl, 16 (1909), No. 3, pp. 413–429*).—Trials were conducted at the Tistofte Experiment Station during the period 1903–1907, to determine the influence of differences in the number of cuttings of alfalfa during the season, on yield, resistance, purity, and quality of the crop. The data are summarized in the following table:

Influence of the number of cuttings on the yield and quality of alfalfa.

Number of cuttings.	Hay per acre.	Protein per acre.	Nitrogen in crop.
	Cwt.	*Lbs.*	*Per cent.*
4	77.20	1,303	2.66
3	88.97	1,372	2.35
2	84.56	1,070	1.96

As the number of cuttings increased, so did the weakening effect on the plant, the difficulty in keeping the field free from weeds, and the possibility of saving the leaves. Under favorable conditions 3 cuttings proved best, but under unfavorable conditions only 2 cuttings are recommended.

Alfalfa in America, J. E. Wing (*Chicago, 1909, pp. 480, pls. 15, figs. 2*).—This volume gives a historical sketch of alfalfa, describes the plant and its habits of growth, states its soil and fertilizer requirements, and gives directions for the preparation of the seed bed, seeding, cultivation, irrigation, harvesting, and storage. Other alfalfa topics discussed are its diseases, insect and animal pests, and its food value for various animals.

Industrial value of artichokes, L. Chaptal and D. Vidal (*Prog. Agr. et Vit. (Éd. l'Est-Centre), 31 (1910), No. 2, pp. 52–56*).—This article discusses the value of artichokes for the paper distilling and starch industries, comparing them with various other crops used in these industries.

A new type of Indian corn from China, G. N. Collins (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 161, pp. 30, pls. 2*).—A description of a new type of maize is given, with special emphasis upon 4 striking points of difference from other varieties of maize: (1) Erect leaf blades; (2) a frequent monostichous arrange-

ment of leaf blades due to torsion of the leaf sheath, not to a departure from the usual alternate insertion of the leaf sheaths of grasses; (3) the development of the silks within the leaf sheath instead of in a position exposing them to the drying influence of sun and wind; and (4) a waxy endosperm differing from both the horny and starchy endosperms of other corn in texture and optical properties. The first 3 of these qualities indicate drought resistance. Analysis showed the grain to be low in protein and oil as well as in weight per thousand seeds.

Tabulated data relating to the Xenia characters of 20 crosses of Chinese corn, which appeared for the most part to follow Mendel's law, and a historical account of maize in China are also presented.

Experiments with corn, E. G. MONTGOMERY (*Nebraska Sta. Bul. 112, pp. 5–36, figs. 11*).—Two ear-row methods of corn breeding are outlined, and the results of each stated. In the first method, taken up at this station in 1903, 101 ears of Hogue Yellow Dent were used as foundation stock. If a family (all rows tracing to an original mother plant) did not average well, all of its seed was discarded regardless of high yields of one or more rows. No attempt was made to prevent intercrossing with the poorer families planted near the better ones. During 1907 and 1908 selected strains improved by this method gave yields averaging 8.3 bu. per acre more than did the original stock.

The second method, instituted in 1906 with 204 ears of the same variety, produced as good results in much less time and by a simpler process. One-third of each ear was planted in a row 16 rods long. The remnants of these ears were retained and in 1907 arranged in order according to the yield from the seed taken from them in 1906 and planted in this order, those making the highest yield being thus grouped together. "The progeny of the four best ears yielded 9 bu. per acre better than the checks, while the remnants of the original ears yielded 11 bu. better."

The physical characters of the corn plant that are to be considered in seed selection are discussed in full, and directions for conducting breeding plats for a period of 3 years are presented, together with forms for keeping the notes on original seed ears and on the crop from those ears. A type of Reid Yellow Dent, averaging 0.2 oz. less per ear in weight, 0.4 in. less in circumference, 0.7 in. more in length, and 4 in. less in total length per 100 grains than the standard type, is designated as a long smooth type of Reid Yellow Dent, and produced a greater yield than the standard type by 4.4 bu. per acre, with a shrinkage lower by 0.6 per cent.

Data on the relation of yield and size of ear during 1906 showed that the greatest number of bushels was produced with ears averaging 9.12 oz., while in 1907 the average weight per ear from the plats making the highest yield was 9.76 oz. Phenomena observed in the high-yielding rows were (1) low number of barren plants, (2) large number of 2-eared plants, and (3) large number of tillers bearing ears. Investigations failed to show any definite relation between leafiness of plants or strains and their productive capacity. Data indicate that from 1.732 to 3.627 sq. in. of leaf area were required in the production of a gram of dry matter.

The work reported on the economic value of tillers is a continuation of that previously noted (E. S. R., 17, p. 657) and in general confirms the results then reported.

Very little difference in yield resulted from the different methods of distributing seed regularly in hills or irregularly, as in drills. As compared with 1 plant per hill, 3 and 5 plants per hill produced increased yields of 0.4 bu. and 2.6 bu. per acre, respectively.

The deterioration of corn in storage, J. W. T. Duvel (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 43, pp. 12, figs. 3*).—This circular reports an investigation of the deterioration of 5,550 bu. of shelled corn during 69 days storage in a 65 ft. bin in a Baltimore elevator. The variations in weather conditions and of the temperature and moisture content of the grain during the time of storage are stated in full. Nine hundred bu. of damaged corn from the top of the bin were removed, dried, loaded as for shipment, and held on the track 37 days without deterioration in condition, whereas 900 bu. of the best cool corn from the same bin, loaded without drying, became sour and musty in 23 days. After unloading, handling over 5 elevators, weighing 3 times, and reloading, it again heated within 9 days.

The report is regarded as preliminary, and the generalization of results and formulation of definite conclusions are deferred until the investigations are more advanced.

Origin of the Hindi cotton, O. F. Cook (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 42, pp. 12, figs. 2*).—Hindi cotton has a very short staple, and its presence in Egyptian seed constitutes an obstacle to the introduction of varieties from that country, as labor here is not sufficiently cheap to allow it to be sorted out from the longer and more marketable staple, as is done in Egypt. It may prove possible to destroy the plants early in the growing season. Some of its distinctive characters are the larger number of vegetative branches at the lower nodes, assuming a more upright position, the thinner, lighter-colored leaves with very short lateral lobes, a red pulvinus at the base of the leaf blade, nearly orbicular involucral bracts, long-pointed triangular lobes of the calyx, and a petal spot, faint if present, but often entirely lacking. Other distinctive characters appear later in the development of the plant.

The history of the variety and its supposed relationships to American upland varieties, Mexican varieties, and Egyptian varieties, are discussed. Hindi cotton appears to be of American origin instead of a result of hybridization with Egyptian or other old world species, but is not identical with any of the United States upland varieties, being more closely allied with upland cotton indigenous in Mexico and Central America. Since Egyptian and other sea island types appear to have originated in the tropical countries the Hindi variants may be examples of reversion. This fact is supported by the resemblance between Hindi foliage and that of young plants of the Egyptian cotton.

Supply and distribution of cotton, D. C. Roper (*Bur. of the Census [U. S.] Bul. 106, pp. 32, dgms. 4*).—The data and discussions given in this bulletin continue those previously noted (E. S. R., 20, p. 932). The total supply of cotton in the United States for the year ended August 31, 1909, is given as 15,312,885 running bales, and the net imports and exports as 165,451 and 8,574,024 running bales, respectively.

The Sixth International Congress of Delegated Representatives of Master Cotton Spinners' and Manufacturers' Associations, 1909 (*Internat. Cong. Master Cotton Spinners' and Manfrs.' Assocs., 6 (1909), pp. 352, pls. 10, dgms. 3*).—In conection with the report of the proceedings of this congress, addresses are presented on cotton growing in the possessions of Belgium, England, France, Germany, Italy, and Russia, and on the regulation of the supply of cotton in England, Switzerland, and France. Data on variety and other tests conducted in the Belgian Congo are also included.

Note on the extension of cultivation of fiber plants in India (*Agr. Research Inst. Pusa [India] Bul. 15, 1909, pp. 14*).—Notes are given on jute, Bombay hemp, *Crotolaria juncea*, coconut, Rhea, Agave, pineapple, Sansevieria, flax,

plantain, Malachra and Sida, with special reference to their present distribution in the provinces of India and their extension to new areas.

[Field and manurial experiments with potatoes and mangels, 1909], B. SWANWICK and E. KINCH (*Agr. Students' Gaz., n. ser., 14 (1909), No. 5, pp. 162–167*).—The experiments reported were conducted at the Royal Agricultural College farm, Cirencester, and a private farm at Coates. Those with potatoes consisted of 2 parallel series, one with Scotch seed and the other with Irish seed. The Irish seed produced the more salable potatoes, but showed the more disease. The chief object was to compare the value of various commercial forms of phosphorus, nitrogen and potash, all the plats being dressed with farmyard manure at the rate of 8 tons per acre.

An increased yield of 1 ton 1,600 lbs. of salable potatoes apparently resulted from fertilization at the rate of 200 lbs. calcium nitrate and 400 lbs. of superphosphate (26 per cent soluble) per acre, while there was a corresponding increase of 2 tons 1,300 lbs. from an application of 400 lbs. of superphosphate and 100 lbs. of potash per acre. An application of 400 lbs. of superphosphate, 100 lbs. of potash, and 150 lbs. of sulphate of ammonia yielded 4½ tons more salable potatoes than the check plats. The use of 1 cwt. of sulphate of potash has apparently increased the yield by 17 cwt. of good potatoes. Sulphate of ammonia gave better results as a nitrogenous dressing for potatoes than calcium nitrate, although the latter with superphosphate, and with superphosphate and potash, gave reasonable profits. The general experience on this farm is in favor of sulphate of ammonia as the best nitrogenous manure for potatoes, always with addition of superphosphate.

The chief object of the experiments with mangels was to test the comparative value of 4 different forms of nitrogen, and also that of kainit and common salt. Superphosphate was applied at the rate of 300 lbs. per acre, kainit at the rate of 400 lbs., and nitrogenous fertilizers at the rates required to supply the amount of nitrogen contained in 100 lbs. of sulphate of ammonia. The results indicated that no increase in yield was obtained without the application of nitrogenous manures, and that nitrogenous manures in all cases increased the yield of roots, but that in some instances the increase was secured at a financial loss. Valuing the roots at $2.40 per ton, profits were secured from the plats fertilized with (1) superphosphate and nitrate of lime, (2) superphosphate, kainit, and nitrate of lime, (3) superphosphate, kainit, and sulphate of ammonia, and (4) superphosphate, kainit, and nitrate of soda. The addition of kainit to a mixture of superphosphate, calcium nitrate, and calcium cyanamid produced no apparent increase in yield, but when added to a mixture of superphosphate, sulphate of ammonia, and nitrate of soda a marked increase in yield resulted. On the plats near Coates the most striking result was as to the value of the addition of kainit (400 lbs. per acre) to phosphates and nitrogen, the plats so treated showing an average increase in yield of 3½ tons of roots as compared with the plats receiving superphosphate and nitrogenous manures only.

A new forage crop, G. LOPRIORE (*Bol. Quind. Soc. Agr. Ital., 14 (1909), No 20, pp. 947–950*).—The grass *Stenotaphrum americanum* is discussed as a drought resistant plant, with special reference to its botanical characters, history, and geographical distribution.

[Cereal breeding at Cambridge] (*Jour. Dept. Agr. So. Aust., 13 (1909), No. 3, pp. 183–186, figs. 3*).—Crosses were made to combine the baking qualities and cropping power of English wheats and such Canadian varieties as Red Fife. This type was fixed, then crossed with American Club wheat to introduce rust resistance. Experience with 8 generations shows that "a plant which breeds true once breeds true always."

Qualitative weight and foreign material of wheat, harvest of 1908 (*Poids qualitatif et Corps étrangers du Blé (Récolte 1908). Bucharest; Govt., 1908, XIII+62*).—Full statistics are given for each of the departments and communes showing the yields of wheat per acre. The percentage of foreign substances in the wheat harvested from large properties and that from peasant properties averaged 2 per cent and 4.2 per cent, respectively.

The adulteration of forage-plant seeds, F. H. HILLMAN (*U. S. Dept. Agr., Farmers' Bul. 382, pp. 23, figs. 19*).—This bulletin discusses the evils of adulteration of forage-plant seeds with crop seeds and seeds of injurious weeds. The seeds of clovers and grasses and the principal adulterants found in each are described and full directions given for the detection of adulteration.

HORTICULTURE.

The fruit culture in Japan, T. IKEDA (*Tokyo [1909], pp. 110, pl. 1*).—A treatise on fruit growing in Japan, the successive chapters of which discuss the climate of Japan and its local modifications, adaptive ranges of fruits, fruit soils of Japan, indigenous and introduced fruits, varieties of leading fruits in Japan, propagation, pruning and training, and some routine operations in Japanese orchards. An introductory discussion is given of the causes which have prevented the development of fruit culture in Japan and special features of the Japanese fruit industry.

[Report of the Grand Junction Fruit Growers' Association], J. F. MOORE (*Colo. Fruit Grower, 5 (1910), No. 1, pp. 26–30*).—A detailed report for 1909 of this successful fruit growers' cooperative association.

Another mode of species forming, L. BURBANK (*Amer. Breeders' Assoc. [Proc.], 5 (1909), pp. 40–43*).—The author cites several instances in which apparently fixed new species have been produced directly by crossing 2 species and without further selection.

Grafting and its application for various trees and bushes, N. GAUCHER (*Die Veredelungen und ihre Anwendung für die verschiedennen Bäume und Sträucher. Berlin, 1909, 3. rev. and enl. ed., pp. XIV+340, figs. 196*).—A revised and enlarged edition of the author's work, which treats of the principles and methods of propagating trees and shrubs by the various forms of grafting. Specific directions are given for the propagation of a large number of ornamental trees and shrubs, and the best means for grafting all of our common fruit trees, together with suitable stocks for the same, are indicated. The text concludes with a monthly working calendar.

The influence of bagging on the volume accretion of fruits, G. RIVIÈRE and G. BAILHACHE (*Jour. Soc. Nat. Hort. France, 4. ser., 10 (1909), Dec., pp. 752–755*).—Experiments in bagging two varieties of pears are reported, in which the authors found in general that the bagged fruits acquire a much larger volume and consequently a greater weight than the unbagged fruit, thus confirming the results secured by Montreuil and Bagnolet in 1886, which were reported in Loiseau's De l'Ensachage des Fruits.

The present status of apple breeding in America, S. A. BEACH (*Amer. Breeders' Assoc. [Proc.], 5 (1909), pp. 28–36*).—A brief statement of work along the line of systematic apple breeding being conducted at the Central Experimental Farm, Ottawa, and in a number of state experiment stations, as well as by private individuals.

Characteristics of Wealthy apple seedlings, W. T. MACOUN (*Amer. Breeders' Assoc. [Proc.], 5 (1909), pp. 37–40*).—Noted from another source (E. S. R., 21, p. 338).

An investigation relative to the failure of certain American grape stocks in Sicily, A. RUGGERI ET AL. (*Bol. Min. Agr., Indus. e Com.* [*Rome*], *8* (*1909*), *Ser. A, No. 27, pp. 755-768*).—This is the report to the Italian minister of agriculture of a special commission appointed to investigate the cause of the unsatisfactory growth of certain American grape stocks in the Sicilian vineyards. The report indicates that the stocks have failed for various reasons, such as parasitic attacks and lack of acclimation and of affinity between stock and scion, as well as unfavorable soil conditions.

Starting of the buds of vines, F. T. BIOLETTI (*Pacific Rural Press, 79* (*1910*), *No. 3, pp. 41, 47, fig. 1*).—A translation of the results secured by Ravaz in that part of his work which dealt with the influence of various cultural operations on grapes at the time of bud swelling (E. S. R., 21, p. 334).

In general, Ravaz found that good cultivation, fertilizing, irrigation, short pruning or anything which produces strong vegetative growth in the vines tends to delay the spring starting of the buds, whereas vines dwarfed by the vicinity of trees or larger vines, lack of cultivation or other causes which lessen their vegetative vigor, start their buds early. He found that if pruning is delayed in the spring until the end buds have grown an inch or more, the lower buds do not start immediately. The actual starting of the fruit buds may be delayed in some cases one, two, or even three weeks. These results suggest a means of delaying the fruiting period in regions where vines are subject to injury from spring frosts.

The influence of a creosote solution on the growth of grape cuttings, J. BEHRENS (*Ber. Landw. Vers. Anst. Augustenb., 1906, pp. 49-51*).—A number of grape cuttings were immersed in a 1 per cent creosote solution, but neither the growth percentage nor the development of the plants was affected when the immersion was not continued beyond an hour.

The influence of potassium fertilizers on the composition of wine, husks and lees, F. A. SANNINO and A. TOSATTI (*Rivista* [*Conegliano*], *4. ser., 16* (*1910*), *No. 2, pp. 25-29*).—Some data are reported on the use of sulphate of potash as a fertilizer for grapes. The results for the past season show an increase in the sugar content and a diminution of the acidity, together with an increase of cream of tartar in the must. Slight increases of cream of tartar were also found in the husks and lees of the grapes. The work is to be continued.

On the effect of sulphate of iron used as a vine fertilizer on the yield and quality of the product, F. A. SANNINO and A. TOSATTI (*Rivista* [*Conegliano*], *4. ser., 16* (*1910*), *No. 1, pp. 2-5*).—Some experiments were started in 1907 in which sulphate of iron was used as a fertilizer for grapes at the rate of 200 gm. per plant. The results thus far secured indicate that this material tends to increase the quantity of grapes but to reduce somewhat the sugar content of the must, and also to increase the amount of iron in the wines. When the pulps alone were made into wine the amount of soluble iron in the wine was greater, whether the grapes were secured from the fertilized or the unfertilized plat, than when the skins were fermented with the pulps. The work is to be continued on a more extensive scale.

Lemon culture in the Paola region, E. FERRARI (*Bol. Arbor. Ital., 5* (*1909*), *Nos. 1, pp. 33-39; 2, pp. 58-67; 3, pp. 110-120; 4, pp. 145-180*).—A monograph on the lemon with special reference to its culture in the vicinity of Paola, Italy. Consideration is given to the geographic distribution of the lemon, local soil and climatic conditions, the biology of the lemon, methods of propagation, selection of site and soil, planting operations and subsequent culture, harvesting, diseases, insect pests, and the industrial and commercial importance of the lemon. An extensive bibliography is appended.

Mangoes of Florida, J. B. Beach (*Porto Rico Hort. News, 3 (1910), No. 1, pp. 3, 4*).—Brief descriptive notes which originally appeared in the *Florida Homeseeker* are given of a number of varieties of improved mangoes which have been introduced into Florida and fruited there.

The pineapple industry, W. M. Cunningham (*Bul. Dept. Agr. Bahamas, 4 (1909), No. 4, pp. 113–132*).—This is a brief account, including cultural notes, of the pineapple industry in the Bahamas.

Growing blackberries and raspberries in Washington, W. S. Thornber (*Washington Sta. Popular Bul. 18, pp. 4*).—A popular edition of Bulletin 87 previously noted (E. S. R., 20, p. 1037).

The common bean (Phaseolus vulgaris), O. Comes (*Atti. R. Ist. Incoragg. Napoli, 6. ser., 7 (1909), pp. 109*).—A monograph on the common bean relative to its history, phylogeny, economic value, and the systematic botany of its cultivated races. The author calls attention to the possible existence of a toxic agent in the colored seed of *P. vulgaris* which may be similar in character to the cyanogenetic glucosid sometimes found in beans of *P. lunatus*, although he is of opinion that this toxic substance has been reduced to an inconsiderable amount by virtue of the long cultivation of *P. vulgaris*.

Report of coffee investigations, Gorter (*Jaarb. Dept. Landb. Nederland. Indië, 1908, pp. 81–99, pl. 1*).—An outline report, with analyses, of the berries of different varieties of coffee, together with notes and data on varietal and cultural tests.

The best varieties of almonds, E. Marre (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 31 (1910), No. 5, pp. 137–144, figs. 7*).—Descriptive notes are given of the varieties of sweet and bitter almonds grown in the arrondissement of Millau, France.

Some ornamental plants of Macon County, Alabama, G. W. Carver (*Alabama Tuskegee Sta. Bul. 16, pp. 5–24, figs. 8*).—Brief descriptions are given of a large number of evergreen and deciduous trees and shrubs, vines, ornamental grasses, ferns, pond, marsh and bog plants, together with miscellaneous plants and herbs suitable for culture as ornamental plants. A few of the chief merits of each plant in question are indicated, together with the localities where they are most likely to be found growing wild.

Roses, Cochet-Cochet and S. Mottet (*Les Rosiers. Paris, 1909, 3. ed., rev. and enl., pp. IV+VII+355, figs. 66*).—This work treats of the history, classification, nomenclature, and descriptions of the rose genera, together with details for growing roses both out of doors and under glass.

Fifth annual report of the Rhode Island Metropolitan Park Commission of Providence plantations (*Ann. Rpt. Bd. Metropol. Park Comrs. [R. I.], 5 (1909), pp. 85, pls. 5, figs. 25, maps 3*).—This is a progress report to the general assembly of Rhode Island relative to the development of a park system for the metropolitan district of that State. It contains an account of the work already accomplished, together with negotiations in progress for securing further reservations, and suggestions for the development of a complete park system, including estimates of cost. A detached map of the proposed park system accompanies the report.

FORESTRY.

Forest utilization, K. Gayer (*Die Forstbenutzung. Berlin, 1909, 10. ed., pp. XII+637, pls. 2, figs. 356*).—The present edition of this work, which is edited by H. Mayr, has been considerably revised.

The first general division consists of a review of the various purposes for which forest soils are used and the methods of utilizing them. Succeeding sections of the work contain detailed information relative to the exploitation,

preparation and transport of commercial woods, the identification and characteristics of various timber species, the physical and chemical properties and defects of woods, wood preservation and technology, utilization of woods in various industries, yields and commerce. The minor forest products, such as barks, seeds, dyestuffs, resins, etc., are taken up in similar detail as well as other products, incidental to forestry, such as litter, turf, grass, etc. The work concludes with a brief chapter on the utilization of stones and earth.

The forests of the United States: Their use, O. W. PRICE, R. S. KELLOGG and W. T. COX (*U. S. Dept. Agr., Forest Serv. Circ. 171, pp. 25*).—A popular discussion relative to the economic importance of our forests, their extent, exploitation, destruction by fire, and wasteful methods of lumbering and manufacturing, together with suggestions for preserving the lumber supply in this country, in which consideration is given to the duty of the private owner, economy in the mill, preservative treatment of timber, use of substitutes, better tax and fire laws, and forestry education.

Annual report of the department of forestry, C. R. PETTIS (*Separate from N. Y. State Forest, Fish and Game Com. Ann. Rpt., 14 (1908), pp. 27-109, pls. 29*).—A detailed account is given of the operations of the New York state forestry department for 1908, the work being discussed under the following general headings: Trespasses, forest fires, annual forest production, reforesting operations, the forest preserve, and investigations.

The investigations conducted in connection with nursery practice noted from another source (E. S. R., 21, p. 335), together with a report on the complete system of reforesting work, including seed collecting, nursery practice, and field planting, as conducted by the New York state forest service (E. S. R., 22, p. 242).

The total output of the forests and woodland of the State of New York for 1907 amounted to 1,266,754,365 ft. b. m., an increase of 10,544,731 ft. over that of 1906. Detailed figures are given on the production of lumber and minor products and on the production by species.

A monograph on forestry in the Famenne, P. GILLET (*Ann. Gembloux, 20 (1910), No. 1, pp. 15-42*).—A detailed account of the forests and forest management in the Famenne district, Belgium.

Report of forests, H. N. THOMPSON (*Colon. Rpts., Misc. [Gt. Brit.], No. 66, pp. 238, pls. 24, map 1*).—In part 1 of this report the author describes in detail a number of trips made through the forests of the Gold Coast, the character of the country and the vegetation. In part 2 measures are recommended and discussed with a view to conserving the forests and initiating a system of forest policy for their management and development. Part 3 summarizes the physical and climatic features of the Gold Coast and Ashanti, the vegetation of those countries, and forest distribution. A short account is also given of the conditions affecting plant growth and their influence in determining the geographical distribution of the plants, together with statistics of the exportation and importation of forest produce and an estimate of future yield of timber from the forests.

Forestry in Japan, J. B. MOORE (*Conservation, 15 (1909), No. 12, pp. 727-740, figs. 12*).—A descriptive account of forestry in Japan treating of the private, imperial, and state forests, which contain respectively 23,000,000, 6,000,000, and 29,000,000 acres. Information is also given relative to the training received by native foresters and the organization of the Japanese bureau of forestry.

Methods of increasing forest productivity, E. E. CARTER (*U. S. Dept. Agr., Forest Serv. Circ. 172, pp. 16*).—A popular discussion relative to means of extending our forest areas as well as increasing the quantity and quality of forest products, together with estimates of the increase of forest production

through proper management. It is estimated that there is an unutilized area of 80,000,000 acres within our present producing forest, in addition to 135,000,000 acres of unproductive forest land within our virgin or mature forests, and 90,000,000 acres of waste lands which can be made productive by planting or fire protection.

Increment studies in a spruce stand, A. Schiffel (*Zuwachsstudien in einem Fichtenbestande. Vienna, 1909, pp. 25; abst. in Centbl. Gesam. Forstw., 35 (1909), No. 12, pp. 505–527*).—A detailed account with tabular data is given of a large number of increment measurements made in an 80-year old spruce stand which was thinned out at 4 different periods between 1903 and 1908.

Selection of seeds in forestry, P. Guinier (*Ann. Sci. Agron., 3. ser., 4 (1909), II, No. 6, pp. 444–469*).—The author discusses the importance of selection as a means for improving timber species and reviews the literature on the subject of variation among forest species.

Trees of California, W. L. Jepson (*San Francisco, 1909, pp. 228, pls. 33, figs. 83*).—This is intended as a popular working manual of the native trees of California. It contains botanical descriptions of trees arranged according to families, together with information relative to their geographic distribution and economic value.

Illustrations of conifers, H. Clinton-Baker (*Hertford, 1909, vol. 2, pp. 79, pls. 91*).—A continuation of the series of life-size illustrations of the cones and foliage of conifers growing in the British Isles, supplemented by analytical keys to species and short concise descriptions, previously noted (E. S. R., 22, p. 145).

Eucalyptus culture, E. Navarro de Andrade (*A Cultura do Eucalyptus. São Paulo, 1909, pp. VIII+156, pls. 15*).—Part 1 of this work treats of the general characters and descriptive botany of the eucalypts and part 2 discusses the details of eucalyptus culture, including climatic and soil conditions, transplanting and planting operations, subsequent culture, exploitation, destructive insects, cost of planting operations, yields, and returns in major and minor forest products. The subject-matter is based upon the available literature of the eucalypts, together with planting trials conducted during the past 5 years at the Jundiahy arboretum, near São Paulo, Brazil. A descriptive account of this arboretum is appended.

A study of rubber-yielding latexes and the methods of making rubber, C. E. de Mello Geraldes (*Estac. Agr. Cent. [Mexico] Bol. 6, pp. 129*).—This is a Spanish translation made by G. Gomez of the author's review of our present knowledge of caoutchouc-bearing latexes and of methods of preparing rubber from latexes.

[An expedition in search of rubber yielding plants], A. Opazo and C. Reiche (*An Agron. [Santiago de Chili], 4 (1909), No. 3–4, pp. 189–237, figs. 16, dgm. 1*).—The report of a search conducted in the Province of Atacama, Chili, for rubber yielding species, together with an account of the botanical characters, occurrence and tests of a latex-yielding euphorbia (*Euphorbia lactiflua*). Analyses of this latex made at the Agronomic Station, Santiago, Chili, show it to have a resin content of about 28 per cent and with only about 4.1 per cent of insoluble gum. The plant is not considered worth exploiting commercially.

DISEASES OF PLANTS.

Cultures of Uredineæ in 1908, J. C. Arthur (*Mycologia, 1 (1909), No. 6, pp. 225–256*).—In continuation of investigations on heterœcious fungi (E. S. R., 20, p. 52) the author gives a detailed report on studies on the grass and cedar rusts and also on the advance made in segregating the subepidermal rusts which have generally passed under the name of *Puccinia rubigo-vera*.

In the studies reported successful cultures have been made of 23 species which have been previously grown in cultures and reported by the author or other investigators and 10 species the cultures of which are now reported for the first time. Among the latter it is shown that *Puccinia absinthii* has no æcidial stage in its life cycle. Successful inoculations were made with *P. macrospora* from *Carex comosa* sown on *Smilax hispida*, *P. patruelis* from *C. pratensis* sown on *Agoseris glauca*, *P. cinerea* from *Puccinellia airoides* on *Oxygraphis cymbalaria*, *P. koeleriæ* from *Koeleria cristata* on *Mahonia aquifolium*, *P. alternans* from *Bromus porteri* on *Thalictrum dioicum*, *P. obliterata* from *Agropyron biflorum* on *Aquilegia canadensis*, *P. muhlenbergiæ* from *Muhlenbergia glomerata* on *Callirrhœ involucrata*, *Gymnosporangium libocedri* from *Libocedrus decurrens* on *Cratægus pringlei*, and *G. exterum* from *Juniperus virginiana* on *Porteranthus stipulatus*.

The occurrence and cultivation of Pyronema, F. J. SEAVER (*Mycologia*, *1 (1909)*, *No. 4*, *pp. 131–139*, *pls. 4*).—This fungus, which normally occurs on burnt places, can be successfully cultivated on nutrient media. It produces an abundance of fruit on soil or leaf mold that has been sterilized by heating to a high temperature, but will not fruit nor grow to any considerable extent on unsterilized soil or soil heated to temperatures less than 95° C. Steam sterilization serves the same purpose as sterilization with dry heat, provided the soil is sterilized under considerable pressure. Soil sterilized at 110° produces a fair quantity of fruit, while soil sterilized at 135–145° produces fruit in abundance.

As a practical application of these facts the author states that sterilization of soil by heat apparently brings about some changes in the soil other than the destruction of bacteria and fungi, which changes appear to be of vital importance in the cultivation of fungi which normally grow on burnt soil.

Some host plants of Orobanche ramosa, E. NOFFRAY (*Jour. Agr. Prat.*, *n. ser.*, *18 (1909)*, *No. 46*, *pp. 670*, *671*).—Attention is called to the fact that *O. ramosa* is usually described as an annual plant, but the author states that this is due to the fact that its most common host plants, which are tobacco, hemp, tomatoes, maize, and artichoke, are annuals. It has, however, been recently found by him growing on two perennial plants, *Lamium maculatum* and *Glechoma hederacea*, where it has persisted as a perennial.

Report of committee on plant diseases for 1908, A. D. SELBY (*Ohio State Hort. Soc. Ann. Rpt.*, *42 (1909)*, *pp. 68–75*).—A brief summary is given of the observations on plant diseases in Ohio during 1908, particular attention being paid to forcing-house troubles, diseases of truck crops, potato and tomato diseases, and diseases of orchard fruits, small fruits, and grains.

Some little-known plant diseases, A. OSTERWALDER (*Centbl. Bakt.* [etc.], *2. Abt.*, *25 (1909)*, *No. 5–9*, *pp. 260–270*, *pls. 2*).—The author describes the bacterial disease of *Levisticum officinale* due to *Pseudomonas levistici* n. sp., a disease of *Calceolaria rugosa* due to *Phytophthora omnivora*, an attack of *Sclerotinia libertiana* on *Omphalodes verna*, and a nematode disease of Chelone.

The perfect stage of the cotton anthracnose, C. W. EDGERTON (*Mycologia*, *1 (1909)*, *No. 3*, *pp. 115–120*, *pl. 1*, *fig. 1*).—In connection with a study of cotton anthracnose at the Louisiana Stations the author made a search for the perithecial stage of the fungus on the cotton plant. The occurrence of perithecia in cultures had been previously reported (E. S. R., 18, p. 1141), but they had never been found in connection with the living cotton plant.

In August following a period of warm wet weather bolls were found containing the pycnidia, and a study showed the perithecia as a rule entirely embedded in the host tissue with only the beaks extending through the epidermis. The spores of this species are more elliptical and less curved than commonly found

in the genus Glomerella. A study was made of the material to determine the presence of paraphyses, and on the basis of the abundant material the author states that the genus Glomerella must in the future be considered as bearing paraphyses.

The author contrasts the characters of the perfect form of this anthracnose with a number of others and concludes with a description of the perfect form, to which the name *Glomerella gossypii* n. sp. is given.

The blade blight of oats—a bacterial disease, T. F. MANNS (*Ohio Sta. Bul. 210, pp. 91–167, pls. 15, fig. 1*).—A serious disease of the oat crop has been reported in Ohio for several seasons. The author has made an extended study of it and finds that it is chiefly due to bacteria.

The disease is chiefly confined to oats, although a somewhat similar one has been observed to a less extent on timothy and blue grass and on susceptible varieties of wheat and barley. From the observations on timothy and blue grass it is to be noted that the foliage suffers but little, while the culms are killed above the upper joints.

The preliminary effect of the disease is a yellowing, beginning either as small round lesions on the blade or as long streaks extending throughout the blade or even the whole length of the culm and blades. The ultimate symptoms where the disease has made much progress are a partial or general collapse of the leaves, due either to the active lesions within the blades or a weakened vitality of the plant. In advanced stages the affected leaves take on a mottled color, sometimes becoming quite red.

A study of the cause of the disease has shown that it is due to two species of bacteria acting in symbiotic relation; one, a white organism to which the name *Pseudomonas avenæ* n. sp. is given, is apparently the most active, although a second yellowish organism (*Bacillus avenæ* n. sp.) is often present, and in practically all cases observed the two organisms were more or less abundant.

The disease apparently spreads from the soil, and observations gained through artificial inoculations as well as from conditions as they appear in the fields indicate that there is opportunity for selecting resistant strains.

Some fungus diseases of potatoes, F. TIDSWELL and T. H. JOHNSTON (*Agr. Gaz. N. S. Wales, 20 (1909), No. 11, pp. 998–1012, pls. 8*).—Following a general description of the character of fungi and methods of their attack, the authors give an account of the potato rot or late blight, early blight, dry rot, scab, bacterial wilt, nematode injuries, and internal brown spot. Directions are included for the preparation and application of fungicides for the control of these diseases.

Potato blight and its treatment, D. MCALPINE (*Jour. Dept. Agr. Victoria, 7 (1909), No. 11, pp. 698–703, figs. 2*).—Attention is called to the potato blight due to *Phytophthora infestans* and means are suggested for its prevention. Among these treatments the author advises the treating of all seed tubers that are suspected of being infected by the disease by subjecting them to dry heat at 120° F. for 4 hours. This temperature seems to destroy the fungus and the germinating power of the tubers is improved. In addition to the treatment of the seed tubers, spraying the crop with Bordeaux mixture is recommended.

The Fusarium wilt of cabbage, L. L. HARTER (*Science, n. ser., 30 (1909), No. 782, p. 934*).—Attention is called to the wilt or yellows of cabbage, due to an undescribed species of Fusarium. This disease has been under investigation in this Department for a number of years, having been first observed by Smith in 1895.

The more important symptoms of the disease are said to be retarded growth, wilting of the foliage, and yellowing and dropping of the lower leaves. Later the upper leaves are affected and drop off, leaving the stems bare.

In April, 1908, the author isolated the fungus from material sent in for examination, and he has carried on some pot experiments to determine the parasitism of the fungus. After the plants had been growing in pots for about 10 days pure cultures of the fungus were mixed with the soil, care being taken not to injure the rootlets. In about 3 weeks some of the plants began to show symptoms of the disease, and the fungus was recovered from the diseased plants and additional plants inoculated as in the previous case. This seems to show that the Fusarium attacks the plants through the soil, as the control plants did not contract the disease. The matter is to be studied further.

Fiber rot of ginseng, H. H. WHETZEL (*Spec. Crops, n. ser., 8 (1909), No. 88, pp. 229–232*).—During the season of 1909 the fiber rot or end rot of ginseng seedlings is said to have been very general and quite destructive throughout New York and the eastern sections of the country where ginseng is grown. The disease seems to be caused by the fungus *Thielavia basicola*. An account is given of investigations begun to test the value of acid phosphate and other means for the control of the disease.

Treatment for gray rot of grapes, E. ZACHAREWICZ (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 30 (1909), No. 48, pp. 664–666*).—In a previous publication (E. S. R., 15, p. 272) the author described a method of treatment which had proved successful in the control of gray rot of the grape, due to *Botrytis cinerea*. In the present paper the suggestions are repeated and somewhat elaborated.

The author recommends alternate applications of a liquid fungicide consisting of sulphate of copper, powdered soap, and water, to be followed as soon as dry by dusting with sulphur or with sulphosteatite and sulphur. The first treatment should be made when the new shoots have attained a length of 5 to 10 cm., and it is recommended that the application of the liquid be followed with pure sulphur. The second application should be made just before the flowering period, to be followed at intervals with other applications, when the sulphosteatite may be substituted for the sulphur, or sulphur, plaster, and sulphosteatite may be combined.

The adherence of copper fungicides on grape leaves, A. MARESCALCHI (*Coltivatore, 55 (1909), No. 17, pp. 531–534*).—The author gives an account of investigations of Porchet on the adherence of different strengths of Bordeaux mixture and copper acetate. Solutions of Bordeaux mixture containing from 1 to 3 per cent copper and 0.5 to 2 per cent solutions of neutral copper acetate were sprayed upon leaves and the amount remaining upon the leaves was determined. It was found that the 1 per cent neutral copper acetate was as adhesive as the 2 per cent Bordeaux mixture. In both cases the adhesiveness of the copper compound diminished with the increase in the concentration of the solution.

The tendency to diminish the amount of copper employed in making up fungicides is held to be justifiable, as a 1 per cent solution of Bordeaux mixture is as efficient in combating plant diseases as a 2 per cent solution, since from the latter the excess of copper is soon removed by rain.

Diseases of cacao, A. MAUBLANC (*Agr. Prat. Pays Chauds, 9 (1909), Nos. 80, pp. 393–407, pls. 2; 81, pp. 472–479*).—On the basis of the notes and investigations of G. Delacroix, the author describes canker of cacao, witches' broom, root rot, and various diseases of the branches, leaves, and fruits of cacao.

A disease of Lavatera, F. J. CHITTENDEN (*Jour. Roy. Hort. Soc. [London], 35 (1909), No. 2, pp. 213–215, fig. 1*).—The author describes a disease of *L. trimestris* due to the fungus *Colletotrichum malvarum*. Repeated sprayings with Bordeaux mixture have checked the disease but have not completely stopped its progress.

A disease of Antirrhinum, F. J. CHITTENDEN (*Jour. Roy. Hort. Soc.* [*London*], *35* (*1909*), *No. 2, pp. 216, 217, fig. 1*).—A description is given of a disease of snapdragons due to *Septoria antirrhini*. This appears to be the first report of the occurrence of the fungus in Great Britain, but according to the author the plants about Wisley Laboratory were severely attacked during the past summer. It is believed that spraying with Bordeaux mixture or potassium sulphid solution would protect the plants from attack.

A Fusarium disease of the pansy, F. A. WOLF (*Mycologia, 2* (*1910*), *No. 1, pp. 19–22, pl. 1*).—The author states that for the past two seasons a stem and root disease has been observed at Lincoln, Nebr., that has proved very destructive.

The disease is characterized by the sudden dying of the plants, and when such a plant is pulled up a dark sunken area on the stem just at the surface of the ground is apparent. The root system is destroyed, leaving only the main roots.

A study was made of some of the diseased material and a species of Fusarium was found in all the material. This fungus was isolated and inoculations made, producing the typical forms of the disease. The fungus, which appears to have been hitherto unreported, is described as *F. violæ* n. sp.

Some fungi growing both on coniferous and deciduous trees, L. ROMELL (*Mycologia, 1* (*1909*), *No. 6, pp. 265–267*).—The author notes the occurrence on *Pinus abies* of *Dædalea unicolor*, a fungus common on deciduous trees; *Polyporus zonatus* and *P. adustus* on Swedish spruce; *P. giganteus* on the oak and on *Pinus silvestris; Polyporus pinicola*, which is commonly found on coniferous trees, is reported on Cerasus, Alnus, and Betula: *Stereum ferrugineum* on the oak and pine, etc.

Some diseases of tree seeds, F. W. NEGER (*Tharand. Forstl. Jahrb., 60* (*1909*), *pp. 222–252, figs. 4*).—A study is reported on some of the causes of sterility in tree seeds and a number of fungi found in seeds are described. Among the fungi *Urocystis italica* was found to be more or less destructive to acorns, chestnuts, and the seeds of white fir. In addition to Urocystis a second fungus was found in the fir seed, and the systematic relationship of the two fungi is discussed. In conclusion the author briefly describes a disease of the seed of the horse-chestnut.

Disease of chestnut trees (*Prog. Agr. y Pecuario, 15* (*1909*), *No. 651, pp. 673, 674*).—A synopsis is given of the report of a commission appointed to investigate a serious disease of chestnut trees in northern and northeastern Spain.

The cambium of the diseased trees shows a marked discoloration, the young shoots are pale, and the leaves chlorotic. The disease is believed to have been present in Spain for many years, but only recently has it become serious. Its cause was not definitely determined, but the trees appear to be attacked through their roots. The establishment of stations for the study of the problems connected with the disease is advised.

Some fungus parasites of Phylloxera, P. BACCARINI (*Bul. Soc. Bot. Ital., 1908, No. 1–3, pp. 10–16, fig. 1*).—Notes are given on a number of fungi cultivated from the bodies of phylloxera, and among them the author recognizes species of Phoma, Alternaria, Macrosporium, Cladosporium, and Penicillium.

Bordeaux spraying, S. U. PICKERING (*Jour. Agr. Sci., 3* (*1909*), *No. 2, pp. 171–178, dgm. 1*).—The author gives an account of some of the changes observed to occur in Bordeaux mixture during its use.

He states that when lime is added to copper sulphate, different basic sulphates are formed, depending on the proportions taken, and that when sprayed on plants these are decomposed by the carbon dioxid in the air, forming cop-

per carbonate together with some copper sulphate. The fungicidal action of the mixture is to be attributed to the copper sulphate. If lime is added in quantity just sufficient to precipitate all the copper, and in order to secure this it must be added in the form of limewater, $4CuO,SO_3$ is formed, which by the action of carbon dioxid will reproduce 25 per cent of the copper sulphate taken. If, however, sufficient lime is added to produce a slight alkaline reaction $10CuO,SO_3$ is formed, and the action of carbon dioxid will reproduce only 10 per cent of the copper sulphate. When the lime amounts to from 1.2 to 5 parts of lime for each of copper sulphate the precipitate is considered to be a double basic sulphate of copper and calcium. Where equal quantities of lime and copper sulphate are used, as is often recommended, such a proportion would leave a large excess of lime beyond the minimum required. On carbonation this excess, or a greater portion of it, would be attacked by the carbon dioxid before any of the copper compound itself is attacked. In this mixture about 10 per cent of the copper sulphate would be reproduced.

With the more dilute Bordeaux mixture which is made with limewater, the action is more immediate, and as it contains no gritty particles of lime and its efficiency is $2\frac{1}{2}$ times that of the ordinary mixture, its use is strongly recommended.

Various Bordeaux mixtures were made by the author, and carbon dioxid passed through them to determine the liberation of the copper in the mixture. It was found that with the so-called Woburn Bordeaux 25 per cent was liberated in 2 hours, with a gradual increase for 2 days, until 40 per cent of the copper was in solution. With the other mixtures smaller quantities were liberated, and the efficiency of the Woburn mixture compared with the ordinary Bordeaux mixture is about as 12 : 1, or $1\frac{1}{3}$ lbs. copper sulphate in 100 gal. water by the Woburn formula is as efficient as 16 lbs. by the ordinary method of manufacture.

A study was made of dried Bordeaux mixture, the effect of the addition of molasses to Bordeaux mixture, the chemistry of soda Bordeaux, etc. The dried Bordeaux, from the way in which it is made and the chemical changes taking place, is considered a very inefficient spraying material. The addition of molasses to Bordeaux mixture, which is advocated by some as making the mixture more adhesive to the leaves, is held to result in the liberation of more copper where used with the more dilute solution, but with the ordinary Bordeaux it is not believed to have any particular value. Bordeaux mixture made by the Woburn formula can not be kept in iron vessels, as electrolysis is set up, with the formation of iron oxid.

The author made an examination into the chemistry of soda Bordeaux mixture, and it is said that the reaction requires the addition of 1.84 parts of crystallized carbonate of soda to 1 of sulphate of copper. If either less or more carbonate is used a considerable amount of copper remains in solution. In conclusion the author says that such fungicidal action as soda Bordeaux has is no doubt due to the soluble copper which is present in it for a limited time immediately after its preparation. It can not be regarded as an efficient fungicide, and reports on its action seem to be generally unfavorable.

The action of lime in excess on copper sulphate solutions, J. M. BELL and W. C. TABER (*Jour. Phys. Chem., 11 (1907), No. 8, pp. 632–636, dgm. 1*).—Laboratory experiments were conducted to determine the composition of the solution and of the precipitates obtained when lime and copper sulphate solutions were mixed in different proportions and concentrations. Previous investigators have held that the composition was very variable, but the authors state that if the materials had been compounded at a uniform temperature the solutions would have been found constant in composition.

The authors prepared a series of solutions containing various quantities of copper sulphate with an excess of lime. After being kept at a constant temperature for several weeks the solutions were allowed to stand for several days to allow the subsidence of all the precipitate and both the solutions and precipitate examined. The solutions were found to contain lime and sulphuric acid (SO_3) without any trace of copper, while the precipitate in every case showed the presence of gypsum and a second white solid which was believed to be calcium hydroxid. The copper hydroxids in the precipitate are believed to be copper oxids in different stages of hydration, differing somewhat in their characteristics.

The authors state that in the preparation of Bordeaux mixture a great excess of lime is added, and consequently the solution will contain calcium oxid and sulphuric acid while the precipitate consists of lime, gypsum, and blue copper hydroxid. As the solution fails to show the presence of copper by the common tests it seems that the beneficial effect obtained from the use of Bordeaux mixture must be attributed to the blue copper hydroxid or to the minute quantities of copper in solution.

A new copper salt and its use as a fungicide, P. Malvezin (*Bul. Soc. Chim. France, 4. ser., 5 (1909), No. 23, pp. 1096–1098*).—A description is given of a copper salt which is said to be a combination of formalin, hydrate or hydrocarbonate of copper, and sulphuric anhydrid, and to be dimethanal-disulphite of copper. It is thought to have active fungicidal properties, and would probably be valuable for use in combating diseases of plants.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

Prairie dog situation, T. H. Scheffer (*Kansas Sta. Circ. 4, pp. 7, fig. 1*).—This circular reviews the work carried on in Kansas against the prairie dog and gives a detailed account of the station's method of poisoning.

The poison mixture is prepared and used as follows: One oz. of green coffee berries is mixed with the white of 1 egg and allowed to stand at least 14 hours. One oz. of strychnin is dissolved in ½ pt. of boiling water. One oz. potassium cyanid is dissolved in ¼ pt. of hot water and allowed to cool. A little warm water is added to the mixture of coffee and eggs and mixed with the potassium cyanid. This mixture is then strained through a coarse sieve into the mixing vessel and 1 pt. of sirup added. The hot solution of strychnin is next mixed with 1½ oz. of alcohol and added to the other mixture. After thoroughly shaking and stirring the contents of a quart can of the mixture it is poured over ½ bu. of clean wheat or Kafir corn and stirred until every part is thoroughly wet with the poison, then 2 or 3 lbs. of fine corn meal stirred in to take up the extra moisture. The mixture is allowed to stand over night and put out early the next morning if pleasant, half a tablespoonful or less of the bait being placed in 2 or 3 little bunches at the outside of each burrow occupied by prairie dogs. Only occupied burrows should be poisoned. A half bushel of grain should poison from 500 to 600 holes.

In a recent survey of the former extensive prairie dog territory of western Kansas lying between the Union Pacific Railroad on the north and the Santa Fé on the south it was found that over most of this region the prairie dog is no longer of economic importance. In several other sections, however, particularly along the flats and breaks adjacent to the Smoky Hill River, the prairie dog has yielded ground but slowly and still constitutes a serious menace to stock grazing and dry-land farming.

Second annual report of the committee of control of the South African central locust bureau, C. FULLER (*Ann. Rpt. Committee Control So. African Cent. Locust Bur., 2 (1908), pp. 86*).—This, the second report (E. S. R., 21, p. 451), is presented in 2 parts.

In part 1 (pp. 1–58), which relates to locust destruction in South Africa in 1907–8, a summary of the work is first given, followed by detailed reports of the British administrations, German Southwest Africa, and Mozambique, upon which it is based.

The occurrence of the locusts and the work of control in Cape Colony is reported upon by C. P. Lounsbury; in Natal, by A. Kelly; in the Transvaal, by C. W. Howard; in the Orange River Colony, by R. J. Davys; in Rhodesia, by W. Honey; in Basutoland, by L. Wroughton; in Bechuanaland Protectorate, by B. May and W. D. McKellar; in Swaziland, by D. Honey; and in Mozambique, by J. Valdez. Egg parasites are reported to have been present in Natal in unusual numbers, two-thirds of the eggs laid being thus destroyed. The amount of good done by locust birds all over the subcontinent was unprecedented.

In part 2 (pp. 61–85), the minutes and proceedings of the second annual meeting of the committee of control of this bureau, held at Durban, Natal, August 10–11, 1908, are presented.

Army worms and cutworms on sugar cane in the Hawaiian Islands, O. H. SWEZEY (*Hawaiian Sugar Planters' Sta., Div. Ent. Bul. 7, pp. 5–32, pls. 3*).—Of the 35 species of cutworms and army worms known in the Hawaiian Islands, the majority are native and live mostly in the mountains or high plains. Only four of the native species have so far become pests in cane fields, the others having apparently been kept in check by their parasites and other enemies, or have remained at higher elevations than the cane fields. Eight of the more important species are here considered and accounts given of the habits and life history so far as known.

The army worm is the most injurious of these pests in cane fields in Hawaii, usually occurring in lowlands and grassy regions. Although the moths breed more or less the year round they are more prolific, or breed more favorably from November to April. In connection with other cutworms they sometimes strip the leaves of the cane, leaving nothing but midribs.

Cirphis amblycasis, a native species closely resembling the army worm, does not occur in sufficient numbers to be injurious. It feeds on various grasses of the lowland and has been found in the higher cane fields of the sugar plantations of Hamakua and Hilo districts of Hawaii. *C. pyrrhias* is a native moth, usually living in the native forest regions above cultivated lands. The caterpillars normally feed upon grasses and on sedges, particularly *Baumea meyenii*, a large equitant-leaved species growing on the mountain ranges at elevations of 1,000 ft. and more. The grass army worm (*Spodoptera mauritia*), which occurs in Mauritius, West Africa, and throughout the Oriental and Australian regions, was formerly a very serious pest in the grass lands and sugar-cane fields of the Hawaiian Islands, but their numbers have been greatly reduced by the introduction of the Mynah bird. Besides feeding on grasses and sugar cane, they also eat corn, peas, beans, and probably other kinds of garden plants.

The lesser native cutworm (*Feltia dislocata*), a native species, is often reported numerous locally in cane fields, but the author has found it more injurious to garden crops. The larger native cutworm (*Agrotis crinigera*), another native species, "sometimes occurs in sugar cane, but more often attacks other vegetation rather than grasses and cane. It is fond of garden peas and beans and other garden plants, and I have found them abundant in fields of cowpeas. I have also found them feeding abundantly on a native shrub (Sida), also on several kinds of weeds as Portulaca and Datura." The black

cutworm (*A. ypsilon*) occurs in the islands but has not been found to be very abundant in cane fields. The variegated cutworm (*Lycophotia margaritosa*) is a cosmopolitan species which, in Hawaii, feeds on sugar cane. Remedies are briefly considered. The Mynah bird, introduced from India 20 or more years ago for the purpose of feeding upon army worms and cutworms, is said to be one of the best checks. The golden plover (*Charadrius fulvus*) also lives largely on these caterpillars. This bird comes from Alaska to these islands in August and remains until April. The English sparrow is abundant in Oahu, though not on all the other islands, and has been observed to prey upon army worms to some extent.

From 25 to 35 per cent of the caterpillars collected in cane fields in different parts of the islands have been found to be parasitized by a tachinid, and in 1 lot sent to the station from Hamakuapoko, Maui, 70 per cent were parasitized. A large tachinid (*Cætogædia monticola*) which occurs in California and is found throughout the Hawaiian Islands on the lowlands and well up into the mountains has been reared by the author from 11 different species of caterpillars. This species has been found by the author to be a leaf-ovipositing species. As many as 4,944 eggs were taken from the uterus of a female; these were found in all stages of development, some apparently ready to hatch. The purpose of the thickened egg shell is thought to be to protect the inclosed maggot from drying up too soon, if it should happen to remain on the leaf for any length of time before being eaten by a caterpillar, and to permit of the egg's splitting open under the pressure of the caterpillar's mandibles, allowing the maggot to escape safely instead of being crushed in the egg, as it would be if the egg were soft.

A species near *Ichneumon brevipennis* is described as *I. koebelei* n. sp. This species is said to have been introduced into the islands from America several years ago by Koebele. It has now become generally distributed and is usually common where there is an abundance of army worms and cutworms.

The codling moth or apple worm in Georgia, W. V. Reed (*Ga. Bd. Ent. Bul. 29, pp. 37, figs. 23; rev. in Jour. Econ. Ent., 2 (1909), No. 5, pp. 369, 370*).—This bulletin consists of 2 parts.

In part 1 (pp. 3–21), life history studies and observations of parasitic and predaceous enemies are reported. Three generations and part of a fourth occur in Georgia, but it is considered probable that some years the generations will not exceed 2 and part of a third. The emergence of 14 moths observed at Cornelia in 1906 varied from May 6 to May 24; of 14 moths at Pomona in 1907, from April 25 to May 17; and of 22 moths at Tallapoosa in 1908, from April 9 to April 26, thus illustrating the yearly variation with the temperature in the emergence of the spring brood.

A record of 964 eggs observed showed 864 to be laid upon the foliage (832 on the upper and 32 on the lower surface), 92 on the fruit, and 8 upon the twig. Of the total number, 184 were parasitized by *Trichogramma pretiosa*. The average length of the egg stage for those laid in early spring (April and May) and in midsummer was 9 and a fraction days and $5\frac{1}{2}$ days respectively.

The larva was frequently found to feed several days in the calyx cavity before attempting to burrow into the fruit. Moths were obtained from larvæ which had been reared on a leaf diet entirely, and larvæ one-fourth grown were observed in the orchard feeding on the foliage. Examinations of the 3,920 infested apples on 5 trees, showed 74 per cent to have entered by the calyx, 16 per cent by the side, and 8 per cent by the stem. "From 13 observations on the first brood of larvæ the time varied from 17 to 41 days or an average of about 4 weeks. From 45 observations made during July, the time varied from 13 to 36 days or an average of less than 3 weeks. From the 58 observations made during

the season, we would have an average of about 24 days that the larvæ remain in the fruit." Observations of 20 larvæ of the first brood after they left the fruit to determine the period they remain in the cocoons showed a variation from 2 to 13 days, while at the time the report was written, one of the larvæ had not pupated and was apparently about to pass the winter without doing so. The author believes the insect to be capable of living from 10 to 11 months in the cocoon and that in all probability the hibernating larvæ, under certain conditions, will live over an entire season and emerge the following year. A dry and well-protected condition is believed to be essential in causing the larvæ to remain a considerable time in the cocoons. The total time spent in the cocoon as a larva and a pupa varied from 8 to 25 days, with an average of a little over 14 days.

On an average when confined the moths live less than a week, and although in one instance, under favorable conditions, a moth lived 25 days, it is concluded that 2 or 3 weeks at the outside marks their existence normally. Records of the total time required for the life cycle of the second generation varied from 35 to 65 days, or on the average, 49 days. A life history chart for 1908 illustrates graphically the development of the three generations and part of the fourth.

T. pretiosa is the most beneficial parasite, as many as 5 having been bred from a single egg. A small red spider (*Anystis agilis*) was found to be an active predaceous enemy of the larvæ and pupæ. The Pennsylvania soldier beetle (*Chauliognathus pennsylvanicus*) destroyed large numbers of larvæ and 4 species of ants (*Dorymyrmex pyramicus*, *Stenamma* [*Aphænogaster*] *fulvum*, *Monomorium minutum minimum*, and *Cremastogaster ashmeadi*) were observed to gnaw into the cocoons and destroy larvæ. A hymenopterous parasite (*Hallichella* sp.), was frequently bred from the pupæ and seemed to be quite a valuable parasite. Birds are important enemies and bats are thought to destroy the adult moths.

In part 2 (pp. 22–37), spraying experiments conducted at Tallapoosa and Pomona are reported followed by a consideration of the general benefits of spraying, and of banding as an adjunct method. At both places, 8 to 12 trees were included in each of 9 plats. Spraying experiments were made with arsenical Bordeaux, consisting of lime 6 lbs., bluestone 3 lbs., disparene 2 lbs., and water 50 gal. The first application was made just as the petals fell; the second, just before the calyx closed; the third, 10 days later; the fourth, 14 days later; the fifth, when the second brood eggs hatched, and the sixth 2 weeks later. "But little difference was indicated in the value of the first 3 sprayings, or whether applied just as the petals fell or a week later just before the calyx closed. Late sprayings for the second brood showed only 2 to 5 per cent benefit, and when added to the early sprays increased their benefit by about the same amount."

The author considers that 2 sprayings, "the first applied just before the calyx closes and the second from 7 to 8 weeks later when the second brood appears, give the best results from an economic standpoint, 90 per cent of the fruit being protected. Late sprayings alone are of very little value and, unless preceded by a spraying before the calyx closes, should not be attempted."

In order to test the value of the banding system, bands were placed, May 16, on 16 selected trees. The bands were examined weekly until August 11, and afterwards at irregular intervals until September 28. As from 5 of the 16 trees 3,920 infested apples were gathered, and but a little over 8 per cent of the codling moth larvæ that entered the fruit were trapped, the author concludes that banding even as an adjunct method of fighting the codling moth is a waste of time.

The review is by E. D. Sanderson.

The single spray for the codling moth, A. L. MELANDER (*Washington Sta. Popular Bul. 17, pp. 4, figs. 3*).—This bulletin replaces Popular Bulletin 5, previously noted (E. S. R., 20, p. 162). Following are some of the special recommendations:

Spray your trees with arsenate of lead, using 1 lb. to 50 gal. of water. Begin to spray when 80 per cent of the blossoms have fallen, and have enough outfits on hand to be through in 8 days. Use Bordeaux nozzles only, because they throw a coarse penetrating stream. . . . Set the nozzles at an angle of 45° by means of an elbow coupling. Throw the spray directly into the throat of every flower. To do this the nozzle will have to be held above the branches most of the time, and the spray rained down. Never use a misty spray. . . . Do not spray at less than 80 lbs., and if possible use 200 lbs. or more. Stay with each tree until the bottom of every blossom is filled, even if it may seem a great waste of time and material. Select a blossom here and there and cut it in two, to see if your spraying has filled the cup beneath the stamens."

The brown-tail moth [in New York State], E. P. FELT (*Jour. Econ. Ent., 2 (1909), No. 4, p. 307*).—A small infestation was discovered in June in the town of Rye, near the village of Port Chester, only about 1,000 ft. or so from the Connecticut State line. The infested area and its vicinity was gone over several times with a cyclone burner and in addition the few trees and shrubs in the vicinity were repeatedly sprayed with a contact insecticide.

Control of the Mediterranean flour moth by hydrocyanic-acid gas fumigation, F. H. CHITTENDEN (*U. S. Dept. Agr., Bur. Ent. Circ. 112, pp. 22, figs. 5*).—*Ephestia kuehniella*, first discovered in a flour mill in Germany in 1877, appeared in destructive numbers in Canada in 1889. In 1892 it was reported as injurious in mills in California and in 1895 in New York and Pennsylvania. Since that time it has gradually spread until now it is known to occur in practically all of the principal milling centers, and is attracting more attention than any insect that ever infested mills or other buildings where cereals are stored. Infested flour becomes felted together and lumpy and the machinery becomes clogged, necessitating frequent and prolonged stoppage and the loss of thousands of dollars. Although the larva prefers flour or meal, it will attack grain if these are not available, and flourishes also on bran and prepared cereal foods, including buckwheat, grits, and crackers. It lives also in the nests of bumblebees and in the hives of the honey bee.

The author discusses the first use of hydrocyanic-acid gas against insects in stored products, the value of the method, and the chemicals and other supplies required, and the proportions to be used. Ten oz. of cyanid of potassium and corresponding amounts of other ingredients to 100 cu. ft. of air space is said to be a standard for mill and grainary fumigation. Additional quantities are necessary when buildings can not be tightly closed. Good results can not be expected with an exposure of less than 16 or 18 hours, while a period of from 24 to 36 hours is preferable. As aids in computing the exact proportions for buildings of about 1,000 barrels (daily) capacity, tables are given designating the dimensions and cubic contents of each floor and the amount of chemicals to be used. Directions for the preparation of the mill or other building for fumigation, cleaning the mill, methods of stringing a building for fumigation, combining the chemicals, etc., follow.

The pecan case bearer, G. W. HERRICK (*Texas Sta. Bul. 124, pp. 4–10, figs. 5*).—The pecan case bearer (*Acrobasis nebulella*) is reported to have been a source of considerable loss in Texas for several years and probably the most serious pest attacking the pecan.

"During the spring of 1909, it was very abundant in the vicinity of Cuero, Tex., and did a great deal of injury to pecan orchards in that locality. In 1 orchard from which the crop of nuts netted nearly $2,000 in 1908 the owner thought his crop in 1909 would hardly pay to gather owing to the injuries by this insect. . . . The insect seems to be quite widely distributed and has more than one food plant, although the hickories seem to be preferred. . . . The larvæ injure the leaf buds principally as the leaves begin to appear in the spring. The overwintering young larvæ congregate at the ends of the young branches and begin eating the young leaves as fast as they come forth. In other cases where the young leaves get a start the larvæ tie them together with silk and form their cases inside of this blackened, ragged mass made up of cases, silk, excrement, and wilted and dried leaves. Often a tree will struggle along for some time trying to put forth its leaves." The injury is not wholly confined to the youngest leaves, for the older well-developed leaves are often eaten full of irregular holes and the flower buds are often attacked and seriously injured.

The young larvæ live upon the trees all summer but do not attain a very great size nor commit conspicuous injury owing to the large amount of well-developed foliage. The fact that they appear in such numbers and with such suddenness in the spring just as the buds begin to put forth shows that they must winter over in great abundance. In the vicinity of Cuero, the larvæ become active in March and by the middle of this month their depredations are noticeable and serious. During the course of rearings of larvæ by the author no parasites were bred and with the possible exception of a species of spider no natural enemies were observed in the field, though a tachinid, 2 or 3 ichneumon flies, and a very minute hymenopteran were reported by Gossard (E. S. R., 17, p. 479) to have emerged from cages in which he was breeding the larvæ and pupæ.

Trees at Cuero, sprayed on April 5, with 3 lbs. of disparene to 50 gal. of water, were examined April 27 and but few larvæ found, the owners considering the experiment a complete success. It is recommended that an application of arsenate of lead be made as soon as the buds burst through the bud scales. From an experiment conducted in a large young pecan orchard at Jacksonville, Tex., it appears that the bud moth (*Proteopteryx deludana*) can be held in check by winter spraying with the lime-sulphur mixture. The author is of the opinion that the case bearer might also be controlled in the same way.

A dangerous alfalfa insect, E. G. TITUS (*Agr. Col. Utah Ext. Dept. Bul. 1, pp. 4*).—It is stated that of about 30,000 acres of alfalfa in Salt Lake County, Utah, approximately nine-tenths was injured in 1909 by the alfalfa leaf weevil (*Phytonomus murinus*), the occurrence of which in this country has been previously noted (E. S. R., 21, p. 348). The earliest report of damage in Utah was in the spring of 1904 near Salt Lake City.

The life history and injuries are briefly described. "The eggs are laid by the full grown weevils early in the spring, principally in April and May. The eggs are placed in various parts of the plants, but principally in the sheath, from which the younger leaves and buds are growing. They hatch in from 6 to 9 days, the young worm being pale yellowish in color. They at first feed concealed in the developing leaves, buds, and even flowers; as they grow older they work their way to the larger leaves and completely defoliate the plants. . . . Early in the fall the weevils begin leaving the fields and spreading to new territory, flying or crawling in apparently all directions. Before frost comes, they seek shelter, either in the crowns of the alfalfa plants, close to the surface of the ground, under leaves, in weeds and rubbish along ditch banks, in hay or straw stacks, or any well-sheltered spot. . . . Where infestation

is at all heavy, which is especially true after the second year of the presence of the weevil in the field, the first crop of alfalfa is injured from one-half to three-fourths, and this year there are many fields where there are not 500 lbs. of good hay to the acre. The fact that the worms are not full grown when the first crop is cut, causes the loss to the second cutting. The young worms are jolted off the plants, work their way back to the stubble and feed on every sign of bud and leaf that appears, thus keeping the second crop from starting until they are fully grown, and have stopped feeding."

"The first crop should be cut as early as possible, the ground disked and cross-disked as soon as the hay is off and then gone over with a leveler in the same way. These operations will kill a large percentage of the young worms. Then force the second crop as rapidly as possible and repeat the disking and leveling. Clean up all ditch banks, fence rows, old stack grounds and rubbish early in the fall by burning. Ship no hay out of the infested region."

How to increase the death rate among the boll weevils during winter so as to protect the following year's crop, W. NEWELL (*Crop Pest Com. La. Circ. 28, pp. 4*).—This circular emphasizes the importance of fall destruction of all cotton plants by cutting them down and burning before October 15, or at the latest, November 1.

The chinch bug, F. M. WEBSTER (*U. S. Dept. Agr., Bur. Ent. Circ. 113, pp. 27, figs. 8*).—This circular, based on Bulletin 69 of the Bureau of Entomology, previously noted (E. S. R., 19, p. 452), has been prepared in order to impress upon the farmer the necessity of watchfulness and the prompt application of preventive measures where the insect is found to occur in any considerable numbers. Among the topics discussed are the life history, food plants, and losses caused by the chinch bug, its natural enemies, remedial and preventive measures and the prospects of a future outbreak. Within the last year (1908) a number of complaints of serious injury have been made by farmers in Ohio, Indiana, Illinois, Kansas, and Texas. Reports of serious ravages by chinch bugs on lawns have also been made from Brooklyn, N. Y., and Palm Beach, Fla.

The euonymus scale, J. G. SANDERS (*U. S. Dept. Agr., Bur. Ent. Circ. 114, pp. 5, figs. 2*).—This insect is said to be the most serious enemy of the various species and varieties of Euonymus in the eastern United States. Its attacks are almost exclusively confined to this genus, although it has been found infesting the common wild bittersweet (*Celastrus scandens*), especially when growing in proximity to infested Euonymus. In 1886, this scale was reported to be so destructive to Euonymus at Montpellier, France, that it rendered the cultivation of that plant almost impossible, and more recently reports of its serious injury to *Euonymus japonica* have come from Japan. In this country it is reported to occur from Massachusetts south to Georgia and in Ohio and California. It is also known to occur in Italy and Japan.

This scale is exceedingly prolific, the plant which becomes infested soon becoming completely covered. There are said to be at least 2 broods each season and a probable third one in the Southern States. The author recommends repeated thorough spraying of infested plants with kerosene emulsion (not stronger than 15 per cent oil) at intervals of 2 weeks between the first of May and the middle of June, within which time the hatching out of the young takes place. The deciduous species of Euonymus should be treated after the falling of the leaves, or during the winter, with a 25 per cent solution of kerosene emulsion or a solution of whale-oil soap at the rate of 1 lb. to 1 gal. of water.

The house fly, Z. P. METCALF (*N. C. Dept. Agr. Ent. Circ. 25, pp. 8, figs. 5*).—An account of the typhoid or house fly, its life history and relation to diseases, and remedial measures, with suggestions for cities, villages, and country places.

Descriptions of some new Tachinidæ, C. H. T. Townsend (*Ann. Ent. Soc. Amer., 2 (1909), No. 4, pp. 243–250*).—Six genera (Phasmophaga, Cyclotaphyrs, Paragermaria, Eumasicera, Rileyella, and Eucelatoria) and 8 species are here described as new to science.

The species described as new are *Phasmophaga antennalis*, reared in Wisconsin from *Diapheromera femorata*; *P. meridionalis*, a leaf-ovipositing form bred from a walking stick (*Anisomorpha buprestoides*) at Cutler, Fla.; *Cyclotaphrys anser*, reared from importations of brown-tail moth from Simferopol, Russia; *Tachina japonica*, reared from importations of Porthetria from the vicinity of Tokio, Japan; *Sisyropa hemerocampæ*, a larvipositing form reared from the white-marked tussock moth; *Paragermaria autumnalis*, a leaf-ovipositing form, collected at Melrose Highlands, Mass.; *Eumascicera coccidella*; and *Cordyligaster septentrionalis* from Maryland.

Stegomyia fasciata in the French Sudan, G. Bouffard (*Bul. Soc. Path. Exot., 1 (1908), No. 8, pp. 454–458, fig. 1; abs. in Bul. Inst. Pasteur, 7 (1909), No. 5, p. 229*).—An account of the occurrence of the yellow fever mosquito.

Some common insects injurious to truck crops, W. Newell and A. H. Rosenfeld (*Crop Pest Com. La. Circ. 27, pp. 93–131, pl. 1, figs. 21*).—The more important insect enemies of the truck crops in Louisiana are considered in this circular. These are the imported cabbage worm, harlequin cabbage bug, onion thrips, striped cucumber beetle, twelve-spotted cucumber beetle, Colorado potato beetle, potato stalk borer, sweet potato weevil (*Cylas formicarius*), bollworm, destructive pea aphis (*Nectarophora pisi*), bean leaf beetle (*Ceratoma trifurcata*), Argentine ant, wireworms, and cutworms. Remedial measures including cultural methods, fertilizers, insecticides, and fumigation are briefly discussed.

Insect enemies of tobacco, Z. P. Metcalf (*N. C. Dept. Agr. Spec. Bul., 1909, Oct., pp. 72, figs. 56*).—This bulletin is stated to be based on correspondence, a study of the literature on the subject, and observations and experiments conducted largely in Granville County.

Following a brief general account of the injury to tobacco by insects, their control is taken up under the headings of preparation of seedbed and soil, rotation of crops, destruction of suckers and weeds, and spraying. Where arsenicals are used, the last spraying should be done at least 2 weeks and preferably 3 or 4 weeks before harvesting. Summarized accounts are given of the more important pests of the crop, which for North Carolina are considered to be the hornworms, tobacco flea beetle, budworms, and cutworms. Insects mentioned as occasionally injurious to tobacco are the grouse locust (*Tettigidea lateralis*), pith worms, tobacco leaf miner, or splitworm (*Phthorimæa operculella*), margined blister beetle, little brown-burrowing cricket (*Anurogryllus muticus*), and spined tobacco bug (*Euchistus servus*). The lesser insect enemies mentioned are grasshoppers (*Melanoplus femur-rubrum* and *Trimerotropis citrina*), katydids, cabbage looper, tree crickets (*Œcanthus* spp.), and corn root worm (*Diabrotica 12-punctata*). The cigarette beetle and the drugstore beetle (*Sitodrepa panicea*), are the only species recorded as injuring stored tobacco in the State.

A bibliography of sugar-cane entomology, G. W. Kirkaldy (*Hawaiian Sugar Planters' Sta., Dir. Ent. Bul. 8, pp. 73*).—This bulletin consists of 2 parts, first, a list of works arranged under authors (pp. 9–41), then, a preliminary list by orders, of the insects, spiders, etc., occurring in sugar-cane fields. Four hundred and twenty-six species representing 315 genera are listed.

Notes on additional insects on cultivated pecans, G. W. Herrick and R. W. Harned (*Jour. Econ. Ent., 2 (1909), No. 4, pp. 293–295*).—Brief notes on insects affecting pecans, which have come to the author's attention since the pub-

lication of Bulletin 86 of the Mississippi Station (E. S. R., 16, p. 992), are presented.

A sawfly (*Acordulecera maura*) was found on pecan leaves at Agricultural College, Miss., though not in sufficient numbers to produce serious injury. Other species noted as occurring on pecans in the State are a large undetermined species of sawfly, *Aulacaspis pentagona*, *Chrysomphalus obscurus*, *Phylloxera caryæcaulis*, and the San José scale.

Insects on imported nursery stock, P. J. PARROTT (*Jour. Econ. Ent., 2 (1909), No. 4, p. 305*).—Eggs of the rusty tussock moth (*Notolophus antiqua*) and several colonies of the larvæ of the little ermine moth (*Hyponomeuta padella*) which were feeding on cherries, as well as the brown-tail moth, are stated to have been found in New York on imported seedlings.

Division of nursery and orchard inspection, N. E. SHAW (*Ohio Dept. Agr., Dir. Nursery and Orchard Insp. Rpt. 1908, pp. 46, figs. 5*).—This is a brief report of the work of inspection in 1908, to which a list of the nurserymen in the State is appended. Brief notes are included on several of the more important insects of the year including the San José scale, woolly aphis, apple leaf-hopper, locust hispa (*Odontota dorsalis*), white-marked tussock moth, elm-leaf beetle (*Galerucella luteola*) rose chafer, and wheat jointworm (*Isosoma tritici*).

Nursery inspection in Louisiana, A. H. ROSENFELD (*Jour. Econ. Ent., 2 (1909), No. 4, pp. 283–285*).—A description of the inspection methods followed in nurseries in which deciduous stock is grown.

The fumigation of nursery stock with hydrocyanic-acid gas, W. NEWELL (*Crop Pest Com. La. Circ. 29, pp 139–150, figs. 5*).—This circular gives directions for the construction of fumigation houses and the carrying out of the process.

Fumigation, dosage, and time of exposure, J. L. PHILLIPS (*Jour. Econ. Ent., 2 (1909), No. 4, pp. 280–283*).—A brief discussion of the subject as related to fumigation of nursery stock.

Analysis of Paris green, 1908, F. D. FULLER (*Penn. Dept. Agr. Bul. 176, pp. 31*).—The results of analyses of 400 samples are presented in tabular form. The amount of arsenic, calculated as arsenious oxid, varied from 53.94 to 60.97 per cent, with an average of 57 per cent; the arsenic in water-soluble forms from 0.70 to 4.96 per cent, with an average of 1.47 per cent; the arsenic combined with copper from 45.91 to 58.28 per cent, with an average of 54.35 per cent; and the amount of copper expressed as copper oxid from 21.68 to 30.93 per cent, with an average of 29.18 per cent. There was apparently no adulteration with white arsenic.

Publications of the station entomologist, E. D. SANDERSON (*Jour. Econ. Ent., 2 (1909), No. 4, pp. 268–277*).—The author here discusses important points relating to station publications.

FOODS—HUMAN NUTRITION.

Durum wheat flour, E. F. LADD and EMILY E. MAY (*North Dakota Sta. Spec. Bul. 19, pp. 105–114*).—The results of milling and baking tests with durum flour are briefly reported in comparison with other flours.

"The patent flour [from the durum wheat] was of good quality, the yield was 74.4 per cent; for the first clear, 22.7 per cent; and for the second clear, 2.9 per cent of the total flour; while the total yield of the flour was 70.7 per cent of the wheat milled, or not quite as high an average as was found for the durum flours in the experiments [previously] reported [E. S. R., 20, p. 859],

but about the same as for the yield for Fife and Bluestem. It required 4 bu. and 38 lbs. [of the durum wheat tested] to produce a barrel of flour."

The data obtained in the baking tests at the station are briefly reported. Samples of durum flour were sent to housewives for testing, and the reports received are quoted.

"From the data thus far gathered with regard to the growing of durum wheat, the milling of the same, and its value for bread production, we may draw the following conclusions:

"It is claimed by the farmers that durum wheat, in the western part of the State, yields much better than our hard wheats for the same section of the State, [and that it] is much more disease resistant than other wheats generally grown in the State.

"Durum wheat produces as much straight flour as either Fife or Bluestem in the experiments at the experiment station. The number of bushels required to produce a barrel of flour is no greater than the average for other wheats.

"It is claimed that it takes more power to grind durum than for the Fife or Bluestem. It has been shown that processes of tempering durum may have a marked effect on the flour-producing quality of the wheat.

"Bread from durum flour is equal to that produced from the other flours as found on the market. The bread is not so white as that from the average Fife or Bluestem flour, having more of a creamy appearance. The consensus of opinion is that the flavor of the bread is equal, if not superior, to that produced from the best commercial flours, being slightly sweeter and having a more nutty flavor. The bread from durum flour holds the moisture better than that produced from commercial flours."

Bleaching flour, H. ROUSSET (*Rev. Gén. Chim., 12 (1909), No. 19, pp. 308–316, figs. 7*).—A summary and digest of data.

Milling and baking tests, F. D. GARDNER (*Roller Mill, 28 (1909), No. 5, pp. 201–204*).—Tests were carried on under the auspices of the Pennsylvania Station with Dawson Golden Chaff, Reliable, and Fulcaster wheats. Of these Dawson Golden Chaff has given a larger yield than the other varieties, according to the tests summarized. According to the analytical data quoted, Fulcaster contained a fourth to a fifth more protein than Dawson Golden Chaff.

"Bushel for bushel, Dawson Golden Chaff and Fulcaster give practically the same yield of flour. The flour of Fulcaster is highest in both protein and gluten. Its gluten is also relatively high in gliadin.

"The dough from Fulcaster is fairly tough and elastic; that from Dawson Golden Chaff very short and brittle. From equal amounts of flour, Fulcaster makes a loaf of larger volume and one that is lighter and of better texture. In appearance and palatability the consumers reported in favor of Fulcaster.

"This investigation, incomplete as it is, shows that the flour from the soft white wheat is not equal to that from the red wheat when made into ordinary bread, but . . . [doubtless most will agree] that this does not settle the whole question. Flour is extensively used for purposes other than bread making, and it is generally conceded that for pastry, crackers, and other purposes the flour from our soft winter wheats is equally good if not superior to that of the northwestern spring wheats. . . .

"After all is done and said there is but little difference in the nutritive value of flour from different varieties of wheat. Practically the only difference is the way in which their products please the eye or tickle the palate. We need to study bread making to determine the best manner of using flour made from our soft winter wheats."

Relation between the extent of dough fermentation and starch degradation, M. P. NEUMANN and K. MOHS (*Zentbl. Agr. Chem., 38 (1909), No. 9, pp. 633–*

635; abs. in Jour. Soc. Chem. Indus., 28 (1909), No. 20, p. 1099).—A discussion of the part played by carbohydrates in the fermentation of flour. The author states that the diastase contained in the flour is not only active enough to produce the necessary sugar for fermentation but is also capable after 2 hours of producing as much sugar as was originally found in the dough.

Food value of bread, M. E. JAFFA (*Nat. Baker, 14 (1909), No. 166, pp. 52, 54*).—In connection with a discussion of the composition and digestibility of bread and related topics, the author directs attention to the use of raisins in bread and points out advantages which he considers such bread possesses. Mincing the raisins before mixing them with the dough is recommended.

Analysis of a sample of manioc from Reunion Island, E. KOHN-ABREST (*Rev. Soc. Sci. Hyg. Aliment., 7 (1909), No. 8, pp. 253–255*).—Analytical data are reported and discussed.

Honey in cooking and confectionery (*Ann. Rpt. Bd. Hort. Colo., 1908, pp. 102–108*).—A summary of recipes for dishes in which honey is used presented before the Colorado State Bee Keepers' Association at their convention in Denver December 8 and 9, 1908.

The effect of gelatin in ice cream, J. ALEXANDER (*Ztschr. Chem. u. Indus. Kolloide, 5 (1909), No. 2, pp. 101–103; abs. in Chem. Zentbl., 1909, II, No. 15, p. 1270*).—The author concludes that the addition of gelatin in ice-cream making hinders the coagulation of casein, the effect being similar to that which he states is observed when gelatin is added to nitrate of silver solution before precipitation with hydrochloric acid.

On the action of gelatin in ice cream, J. ALEXANDER (*Pure Products, 5 (1909), No. 12, pp. 621–624*).—Noted above.

Law regulating the sale of ices, creams, and beverages in Algeria (*Rev. Municipal, p. 313; abs. in Rev. Soc. Sci. Hyg. Aliment., 7 (1909), No. 8, p. 268*).—The reference journal cited quotes the title without comment.

Pepper and its adulteration, H. A. DUCROS (*Bul. Inst. Égyptien, 5. ser., 2 (1908), No. 2, pp. 185–194*).—Information is given regarding the use of pepper in Egypt as a food and drug, and pepper adulteration is discussed with special reference to local conditions.

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 112–116, pp. 9; 117–118, pp. 3; 119–122, pp. 7*).—The subjects included are the misbranding of a drug product, flour, canned apricots, and mineral water, and the adulteration and misbranding of lemon extract, stock feeds, buckwheat flour, pepper, and strawberry extract.

Official inspections (*Maine Sta. Off. Insps. 14, pp. 101–140; 15, pp. 141–152*).—The first of these publications gives the text of the Maine food and drug law as amended, together with the standards and definitions of foods and drugs and the regulations that have been adopted as revised to September, 1909. This material is provided with an index.

The second of the bulletins discusses the sale of apples and standards for oysters and reports the results of the examination of a number of samples of catsup, cocoa, flavoring extracts, and spirit of nitrous ether.

A personal investigation into the dietetic theories of America, A. BRYCE (*Brit. Med. Jour., 1909, No. 2554, pp. 1665–1668*).—A summary of information gathered in a personal visit to a number of laboratories and institutions in America where nutrition investigations are made.

Dietary studies in rural regions (*U. S. Dept. Agr., Office Expt. Stas. Bul. 221, pp. 142, pls. 4*).—This bulletin contains a discussion of dietaries in American rural regions and the results of dietary studies in Vermont, Tennessee, and Georgia,

Dietary studies in Vermont farmers' families, J. L. Hills (pp. 7–19).—Four dietary studies were made, three in farmers' families in comfortable circumstances and one in the family of an officer of the Vermont Station. On an average, the cost of the food was 23 cts. per man per day, its protein content being 104 gm. and its fuel value 3,462 calories. One of the studies was made in the summer and another with the same family in the winter.

"The cost of the summer dietary is 25 cts. and that of the winter dietary 28 cts. per man per day. The difference seems mainly due to the higher cost of eggs and dairy products during the winter. Both are higher than the average found in 91 farm dietary studies made throughout the United States, but in the opinion of the author the fact that so many of the prices quoted are market prices applied to home-grown products makes a fair discussion of the relative economy of these studies out of the question. In any case they are not expensive, considering the circumstances of the family. Each of them, but the winter one particularly, is an excellent illustration of the fact that with intelligence and care the home maker on the farm can provide a diet as varied and attractive as her sister in the city, and at a moderate cost."

Dietary studies of families living in the mountain region of eastern Tennessee, C. E. Wait (pp. 21–116).—A brief historical sketch of the Tennessee mountain settlements introduces this report of 64 dietary studies made with mountain families, one of these in the suburbs of a large city, 44 near a town of about 3,000 people, and the remainder in families more remote from large centers of population. The majority of the families such as were selected for study live in log houses or simple frame houses and the furniture, etc., is very simple.

On an average, the families living near towns obtained 85 gm. protein, 117 gm. fat, and 565 gm. carbohydrates per man per day, the energy value of the diet being 3,650 calories, and its cost 9.3 cts. In the case of the 19 studies in remote districts, the diet supplied 82 gm. protein, 131 gm. fat, and 560 gm. carbohydrates per man per day, the energy value of the diet being 3,731 calories, and its cost 7.4 cts.

"These studies fully confirm the popular impression that the diet among the people of whom these families are typical is extremely simple and cheap and unattractive, judged by the usual standards. Corn meal, wheat flour, and fat cured pork are the principal kinds of food, to which a few other materials are added in varying proportion. In general, it may be said that these three items make up about three-quarters of the total diet. There is, on the whole, more variety among families living in or near the towns than in remote mountain districts. These differences are probably mainly due to differences in the buying facilities in the various sections. Even the most varied of these diets, however, are much simpler than the majority of those of families elsewhere observed.

"Of the animal foods, pork is by far the most common, and in the majority of cases it is used cured or salted. . . . Buttermilk was more commonly used than in any similar studies; skim milk was also in fairly common use, but whole milk appears in only nine cases. In general, milk was most freely consumed in families where a cow was kept. . . .

"The most common vegetables were white and sweet potatoes, but beans, both dried and fresh, cabbage, turnips, onions, tomatoes, etc., are occasionally seen in the lists. Fresh fruits appear to be little used, even in summer. Dried, canned, and jellied fruits are mentioned occasionally, sometimes in forms peculiar to the locality, such as dried gooseberries and blackberries."

"On the whole, these dietaries represent as much energy as is usual but rather smaller amounts of protein than those indicated by the standards as

desirable for persons of corresponding occupations, though the range in protein consumption is great and some of the families had rather high quantities. . . . The food appeared to be fairly satisfying to the people; enough so, at any rate, for families who might have afforded better not to care to take the trouble to procure it.

"[While] the people of whom these families are typical are . . . considered fairly strong and well developed physically. . . . visitors are almost invariably struck by the quickness with which these mountaineers, especially the women, lose the appearance of youth. . . . Tuberculosis is common and the rate of mortality is rather high. While there are many individual exceptions, the general impression, confirmed by observations made in connection with these studies, is that these mountaineers are not active or energetic, either physically or mentally, as compared with the bulk of our rural population, and are rather generally lacking in ambition and progressiveness."

Dietary studies in Georgia, H. C. White (pp. 117–136).—Of the 14 studies included in this report one was made with a students' boarding club at the University of Georgia, one in the family of a mechanic, and one in a negro family, both living near town, and the remaining 11 with families in mountain districts. The living conditions of the mountain families were very much the same as noted above in connection with the Tennessee families. In this and the other studies data are given regarding the kind and amount of waste and similar topics.

"The protein supplied in the Georgia studies ranged from 44 to 127 gms. per man per day, with an average of 86 gms. This is 2 gms. more than the average of the Tennessee studies, and considerably below the standard requirement for man at moderately active work. . . . The fuel value was [likewise] relatively much higher than the protein content, ranging from 2,207 to 5,970 calories, with an average of 4,243 calories.

"In a few studies in which the fuel value was exceptionally low the energy supplied may not have been entirely sufficient, but in general it may be considered to have met the needs of the subjects. Regarding the adequacy of the protein supplied, the same questions arise as in the Tennessee studies. These people evidently attained fair physical development and satisfied the demands of their appetites on a protein ration considerably below the standard. . . . Anyone familiar with the class of which they are typical will admit, [however], that they age rapidly, seem to have comparatively little power to resist disease, such as tuberculosis, and are neither very ambitious nor progressive."

The cost of the diet was 12 cts. per man per day.

Discussion of American rural dietaries, C. E. Wait (pp. 137–142).—On the basis of the investigations here reported and earlier studies of a similar sort, the general question of diet in American rural regions is discussed, though the author realizes that the data are limited for such a purpose.

"While the number of farms in which the cooking and serving are as good as in corresponding town or city homes is large, in very many others these features of the diet are not as well provided for as the means of the family would permit. This difference is undoubtedly due, at least in part, to the greater number of kitchen and household conveniences in the city homes. The rural population is, however, coming more and more to recognize the importance of running water, ice supplies, good drainage, and other conveniences, not only in saving labor for the housekeepers, but in raising the standard of home life.

"There are, unfortunately, certain groups of people . . . who seem out of the track of general progress and among whom the standards of living have for years remained low. Prominent among these are two groups in the South-

eastern States, the white mountaineers and the negroes, in such regions as the so-called 'black belt,' . . . and the small Mexican farmers who, although living in New Mexico and elsewhere in the southwestern United States, retain the characteristic habits of old Spanish Mexico.

"The mountaineer families stand financially in much the same relation to the bulk of the rural population as do the poor in the crowded sections of the cities to the city dwellers at large. In general, it may be said that the mountaineer . . . dietaries . . . compared with the dietaries of city families in corresponding financial conditions, . . . cost much less and furnish about the same amounts of energy, but are low in protein and also lacking in variety. Data are not available for discussing at length the quality of cooking of these mountaineer families as compared for instance with that of the city poor whom they resemble in some other ways, . . . but it was certainly the opinion of those making the studies that in few of the families was the food well cooked or the diet even reasonably attractive to a person with the usual standards of living. Compared with the dietaries of families in fairly comfortable circumstances throughout the country, the same advantages and disadvantages appear—low cost, sufficient energy, but a striking deficiency of protein, and a lack of variety in the materials used. Could these families be made to realize the importance and comfort of such improvements and conveniences in living as are already found or are coming to be appreciated in many other sections of the country, their dietary habits could undoubtedly be improved at very little increase of cost, and hand in hand with such a change would go an equally important improvement, not only in their physical but also in their social and other conditions. One of the most useful functions of dietary studies, such as those here reported, is, by pointing out existing errors, to pave the way for improvement."

Feeding of European troops in Manchuria during the war of 1904–5, V. NIÉDVIETSKY (*Rev. Intend., 1909, Nos. 180–184; abs. in Rev. Soc. Sci. Hyg. Aliment., 7 (1909), No. 8, p. 268*).—The reference journal cited gives the title only.

The price of food products in France, E. LEVASSEUR (*Rev. Soc. Sci. Hyg. Aliment., 7 (1909), No. 8, pp. 205–240*).—Statistical data are summarized and discussed.

Modern domestic science (*Assoc. Schools Dom. Sci. Lectures 1, pp. 16; 2, pp. 16; 3, pp. 13; 4, pp. 16; 5, pp 19; 6, pp. 24; 7, pp. 22; 8, pp. 19; 9, pp. 20, figs. 2; 10, pp. 19*).—A series of pamphlets designed for instruction by correspondence.

The topics and authors follow: The Practical Application in the Home of a Knowledge of Food Values, by Florence Pummill; The Removal of Spots and Stains, by Mabel T. Wellman; Interior Decoration, by L. Robertson; Floors and Floor Coverings, by E. Buckley; The Chemistry of Cooking, by W. H. Boynton; Sanitation and Hygiene, by Caroline L. Hunt; Household Administration, by Helen M. Day; Household Tests for the Detection of Pure and Adulterated Food, by E. N. Eaton; Fireless Cookery, by Frances Seely; and Marketing, by Caroline L. Hunt.

The destructive effect of shaking upon the proteolytic ferments, A. O. SHAKLEE and S. J. MELTZER (*Amer. Jour. Physiol., 25 (1909), No. 3, pp. 81–112*).—According to the authors' summary, the more essential results of the experiments reported are the facts "that shaking may completely destroy the three ferments—pepsin, rennin, and trypsin; that they are destroyed more rapidly at higher than at lower temperatures; that trypsin is more easily de-

stroyed than pepsin; and that the shaking produced by the respiratory movements is capable of causing some destruction of the ferments. Recent experiments by other investigators show also that other ferments may be inactivated by shaking. . . .

"The assumption is here made that the nature of the destruction of ferments is similar to that which takes place in the destruction of living cells, and that shaking affects a certain structure which is common to living cells as well as to red blood corpuscles and to ferments."

In experiments on the effects of respiratory movements, ferments in rubber or glass containers of suitable construction were introduced into the stomach and peritoneal cavity, a dog and rabbits serving as subjects.

Nuclein synthesis in the animal body, E. V. McCollum (*Amer. Jour. Physiol., 25 (1909), No. 3, pp. 120–141*).—Normal and special rations were used in these experimental studies which were made with rats as subjects. In the author's opinion the recorded data seem to warrant the following conclusions:

"The palatability of the ration is a most important factor in animal nutrition. Without palatability the ration may possess all the necessary food ingredients and yet fail to properly nourish an animal. The failure of previous efforts to maintain animals on a mixture of relatively pure proximate constituents of our foodstuffs was due to the lack of palatability of such mixtures. When sufficient care is given to changing the character and flavor of the food supplied in such simple mixtures, it is possible to induce an appreciable amount of growth. Very young animals adapt themselves to a ration possessing a low degree of palatability much better than do adults.

"Other things being satisfactory, all the phosphorus needed by an animal, for skeleton, nuclein, or phosphatid formation, can be drawn from inorganic phosphates.

"The animal has the power to synthesize the purin bases necessary for its nuclein formation from some complexes contained in the protein molecule, and does not necessarily use purin bases of exogenous origin for this purpose."

The neurocytological reaction in muscular exertion.—I, Preliminary communication. The sequence of the immediate changes in the Purkinje cells, D. H. Dolley (*Amer. Jour. Physiol., 25 (1909), No. 3, pp. 151–171, pls. 2*).—In experiments with dogs exercised in a treadmill, studies of the cerebella showed that physiological activity in nerve cells "results in a definite and consecutive sequence of events which are the morphological expressions of the abstract terms activity, fatigue, and exhaustion." According to the author, the interpretation of the various types of cells and their division into stages is based primarily upon theories of the size relations of nucleus and cell body and of their interdependence as regards a mutual interchange of material, and upon the extension of the doctrine of chromidial apparatus to nerve cells.

As the result of continued activity, there is first a steady increase of the basic chromatic material, then a decrease until "there results a functionally exhausted cell entirely devoid of basic chromatin." The different stages in this process are described.

"The sequence of events is exactly identical with that previously described for anemia and shock, and the reaction to purely physiological states corroborates the opinion advanced that the changes in these conditions are a manifestation of functional activity and represent phases of fatigue and exhaustion."

ANIMAL PRODUCTION.

The causation of sex, E. R. DAWSON (*London, 1909, pp. 196; rev. in Sci. Prog. Twentieth Cent., 4 (1909), No. 13, pp. 165, 166; Amer. Nat., 43 (1909), No. 516, pp. 756–762*).—The aim of the author of this book is to present evidence based on clinical material to show that sex is determined in the unfertilized ovum; that in the human species, and perhaps in all mammals, the female-bearing eggs are produced only in the left ovary and male-bearing in the right ovary because the weaker sex must be derived from the ovary of the weaker side; and that ovulation takes place alternately from right to left ovary.

The secret of sex, E. R. DAWSON (*New York, 1909, pp. 64, pl. 1*).—An abridged edition of the work noted above.

The causation of sex, H. E. JORDAN (*Amer. Nat., 43 (1909), No. 516, pp. 756–762*).—This is a review and criticism of the views outlined in the book noted above. It is pointed out that well-known facts established by researches in cytology and comparative embryology are left out of account in Dawson's theory of sex determination and that there are numerous exceptions to the clinical evidence presented. "By the same methods it would probably be as easy to prove the reverse position, that is, that females come from the right ovary and males from the left."

Mendelian action on differentiated sex, D. B. HART (*Proc. Roy. Soc. Edinb., 29 (1908–9), Nos. 6, pp. 607, 608; 7, pp. 609–618, figs. 3; abs. in Jour. Roy Micros. Soc. [London], 1909, No. 6, pp. 703–705*).—An inquiry into the origin of sex gametes with especial reference to the Mendelian theory of sex inheritance.

The author thinks that gametes originate, not from the germ or sperm epithelium, but from the primitive germ-cell, a generalization which he calls the Owen-Weissmann law. Ovarian and testicular teratomata are considered to be parts of embryos originating from primitive germ cells which have been reduced to gametes but which have retained in part the power of zymotic development not normally possessed by a gamete except by union with another gamete.

The author concludes that the human zygote is an impure dominant of F_1 in Mendel's scheme and that the dominant and recessive determinants do not segregate normally, hence in the twinning of one zygote we always get an equal division of sex determinants. It is pointed out, however, that this is not the case with some animals, as in cattle. According to this view the free-martin is not a sterile cow when the potent twin is a bull, but a sterile bull with the recessive sexual determinants segregated in it, that is, an extracted recessive. Concerning the sex of bees, it is stated that the view of the origin of the drone, a perfect male from an unfertilized egg, is neither a fact nor a theory, but a reductio ad absurdum.

A bibliography of the literature of the subject is appended.

[The law of ancestral heredity], E. DAVENPORT (*Breeder's Gaz., 56 (1909), Nos. 25, pp. 1368, 1369; 26, pp. 1424, 1425; 57 (1910), No. 1, pp. 16, 17*).—A series of articles which discuss the similarity between parent and offspring and the importance of Galton's ancestral law for breeding operations.

The studies of Galton on human stature, and those of Rietz on the inheritance of milk fat production, previously noted (E. S. R., 22, p. 278), are used to illustrate the law that though there may be no close resemblance between an individual and its immediate parent a study of large numbers will show that there is a resemblance between an individual and its total ancestry. Parents produce a great variety of offspring and in those from exceptional parents there is a strong tendency toward mediocrity. To prevent undesirable regression accurate records must be kept of animals used for breeding purposes. At present there

is no adequate method for making official records of what an animal really is with a view to benefiting future breeders who wish to know the facts long after the animal is dead. The ancestral pedigree should contain a complete record of characteristics.

The evolution of British cattle and the fashioning of breeds, J. WILSON (*London, 1909, pp. VIII+147, figs. 23*).—This book treats of the different types of cattle found in Great Britain and Ireland in historic and prehistoric times with special reference to the origin of existing breeds. Use is made of Mendel's law in explaining the results brought about by blending the types brought from time to time by foreign invasions.

Studies on the history of breeds of swine, especially those of Sweden, A. PIRA (*Zool. Jahrb., 1909, Sup. 10, No. 2, pp. 233–426, figs. 52*).—This is chiefly a study of the subfossil bones of swine found in Sweden.

Descriptions and measurements of skeleton fragments found in the various deposits are given in detail and a classification of the different types is made. The systematic position of the peat hog *Sus palustris*, which the author thinks is a domesticated form of *S. scrofa*, is described at length. Besides *S. palustris* and the wild species *S. scrofa ferus antiquus*, the author makes 5 other types, wholly or partially domesticated, which are modifications of one or both of the above-named species. According to the chronology of Montelius, the pig first appeared in Sweden as a domesticated animal in the neolithic period about 500 B. C. The bones of tame swine which are found with those of the wild species in the older deposits are larger than those in the more recent, which leads the author to believe that tame swine of the stone age were not of Asiatic origin but are domesticated forms of indigenous swine. Feral swine became diminished in size by inbreeding, as is the case with all animals under conditions of primitive domestication, and finally resulted in the peat hog.

A bibliography of the subject is appended.

The character of the blood in horses of different breeds, W. L. YAKIMOFF and NINA KOHL (*Monatsh. Prakt. Tierheilk., 21 (1909), No. 3–4, pp. 116–146*).—The blood of English thoroughbred and halfbred saddle and trotting stallions contained a larger number of red corpuscles than the blood of heavy work horses. There was but little difference in the number of leucocytes. The blood of English breeds was more alkaline than that of others, but there was no appreciable difference in the specific gravity of the blood in the different breeds.

Feeding stuffs in the Dutch Indies, J. DEKKER (*Meded. Dept. Landb. [Dutch East Indies], 1909, No. 8, pp. 105*).—This monograph contains analyses of native and introduced grasses, forage plants, and other feeding stuffs in the Dutch East Indies. There is also a discussion of their feeding value, especially for horses, and numerous references to the literature on the subject.

Studies on the gain in nitrogen in well-fed grown animals, K. FRISKE (*Landw. Vers. Stat., 71 (1909), No. 6, pp. 441–482*).—In this investigation 8 grown wethers were fed for 6 months on hay. Animals Nos. 1 and 2 were then slaughtered and their carcasses weighed and analyzed, Nos. 3 and 4 fed for 111 days on a narrow ration 1:2.88 consisting of hay, field beans, and sunflower cake, Nos. 5 and 6 fed for 104 days on a normal ration 1:5.02 consisting of hay, field beans, and ground barley, and Nos. 7 and 8 held as a reserve and fed a wide ration. At the end of the feeding period the remaining sheep were slaughtered.

A considerable gain in nitrogen and in lean meat was found although the actual gain in nitrogen, as shown by the analyses of the dressed carcasses, was much less than was shown by the digestion coefficient. According to the nitrogen balance the average daily available nitrogen per head for sheep Nos. 3 and 4

was 3.68 gm. though the slaughter test showed the actual gain in nitrogen to be only 1.19 gm. daily. For Nos. 5 and 6 the difference was not so large, the average daily available nitrogen per head according to the nitrogen balance being 3.48 gm. while the slaughter test showed an average daily gain in nitrogen of 1.61 gm. per head. The heart, liver, lungs, and kidney were much heavier in the animals fed the narrow ration.

On cellulose digestion in domestic animals, A. SCHEUNERT and E. LÖTSCH (*Berlin. Tierärztl. Wchnschr., 25 (1909), Nos. 45, pp. 826–829; 47, pp. 867–869*).—A review of recent investigations on this subject, together with a report of an experiment with dogs which indicates that cellulose is not digested by them. It is pointed out that previous experiments yielding affirmative results were obtained by using defective methods for determining the cellulose content.

The disappearance of pentosans from the digestive tract of the cow, E. V. MCCOLLUM and W. A. BRANNON (*Jour. Amer. Chem. Soc., 31 (1909), No. 11, pp. 1252–1260*).—This is a report of a preliminary series of experiments on the relative ease with which the pentosans from different plants disappear from the digestive tract of an animal and on the behavior of the methyl pentosans during digestion.

Bovines were used as they are the most efficient of all animals for utilizing coarse feeding stuffs. The animals used in these experiments were grade Durhams, purchased when calves, and weighing about 350 lbs. each. They were placed upon rations derived from a single plant source, the same individuals being used in both series of experiments. When the collections of excreta were made for analysis the animals had been on their respective rations for a period of about 9 months. This gave abundant time for the development of special flora in their digestive tracts in case certain varieties of organisms found a more suitable food supply in one case than in another.

The pentosan content was determined by converting the pentosans into furfurol by the official method. The nutritive ratios and calorific values were made alike in the different rations to reduce the influence of varying amounts of protein. So small an amount of pentose sugars was found in the urine that this factor was disregarded. The pentosans of the corn plant were found present in a form which is less resistant than those of wheat and oats. The methyl pentosans disappeared in greater amount than did the simple pentosans. The following table shows the results obtained with the different rations:

Disappearance of pentosans in the digestive tract of bovines.

Animal.	Daily ration.	Total amount of pentosans in ration.	Disappearance of pentosans.	Disappearance of methyl pentosans.
		Grams.	*Per cent.*	*Per cent.*
1-year-old calf	5 lbs. corn meal; 7 lbs. corn stover; 2 lbs. gluten meal.	1,218.2	67.56	56.38
Same animal at 2 years of age.	do	1,392.0	66.87	78.31
1-year-old calf	7 lbs. wheat straw; 6.7 lbs. whole wheat; 0.3 lb. wheat gluten.	1,107.8	55.55	72.33
Same animal at 2 years of age.	do	1,251.5	46.18	82.23
1-year-old calf	7 lbs. oat straw; 7 lbs. rolled oats	1,083.8	53.87	59.31
Same animal at 2 years of age.	do	1,103.2	55.52	61.05

In order to determine the action of the bacteria in the intestinal tract of the cow in these experiments, a series of fermentations was carried on for 14 days with corn fodder, wheat straw, and oat straw. The behavior of the pentosans

of the plants was the same with these artificial cultures of fecal bacteria as in the feeding experiments. Those of the corn plant were less resistant than those of the oat, and those of the oat less resistant than those of the wheat.

Experiments in pig feeding, T. I. MAIRS and S. W. DOTY (*Pennsylvania Sta. Bul. 95, pp. 3-16, figs. 6*).—Middlings and a mixture of corn chop and tankage were compared as feeds for growing and fattening pigs.

Six pure-bred Cheshires 14 weeks old were used for the experiments, which lasted 17 weeks. Lot 1, which received a ration of middlings, made an average daily gain per head of 0.945 lb. at a cost of 7.4 cts. per pound. For lot 2, fed corn chop and tankage 3:1, the corresponding values were 1.257 lbs. and 7.3 cts. per pound. In the slaughter tests the lots dressed respectively 78.4 per cent and 81.7 per cent of the live weight. The feeds were rated as follows: Middlings $30, corn chop $34, and tankage $28 per ton.

"Pigs on a ration of middlings alone made better use of their feed at first than those on a ration of corn chop and tankage, but later the exact reverse was the case. The pigs on the exclusive middlings ration were not as active and healthy as those on corn chop and tankage, neither did the former eat with the same relish. . . . Neither ration proved very profitable for growing and fattening pigs. The corn chop and tankage had a slight advantage in cost per pound of gain."

Practical swine management, J. G. FULLER (*Wisconsin Sta. Bul. 184, pp. 3-22, figs. 13*).—The purpose of this bulletin is to advise the beginner and student and to answer a large number of questions which frequently confront the swine breeder. The chief topics treated are the selection of breeding stock, the feeding and care of breeding swine, the care of young pigs, buildings for swine, and preventive measures for the common diseases and parasites of swine.

Sustaining horses in long-distance travel, L. OGILVY (*Breeder's Gaz., 56 (1909), No. 24, pp. 1292-1294*).—An account of the methods of feeding employed in recent tests of long-distance riding. The advantages of feeding both sugar and molasses are pointed out. The best mode of use for a long journey is stated to be about 1 lb. of sugar in 5 qts. of water. In some cases horses have to be taught to take it in this form though they will readily eat sugar in the feed.

State horse-breeding and army remount buying in France (*Dept. Agr. and Tech. Instr. Ireland Jour., 10 (1909), No. 1, pp. 43-59, pls. 4*).—An account of the system of state aid to horse breeding, the chief features of which have been in existence since 1665. At the present time there are 22 state studs which are required by law to keep about 3,450 stallions of various breeds. In addition to these there are 1,709 approved stallions in the hands of private owners and 191 authorized stallions. The object of state aid was to keep the army supplied with an approved type of horse fit for service. The annual cost to the state is about £1,146,000.

The cattle trade of western Canada, J. G. RUTHERFORD (*Canada Dept. Agr., Branch Live Stock Comr. Spec. Rpt. 1909, Aug., pp. 23*).—A special report containing a brief history of the Canadian range and present methods of beef production in Canada.

Annual wool review (*Bul. Nat. Assoc. Wool Manfrs., 39 (1909), No. 4, pp. 517-558, pl. 1*).—The usual annual account of the sheep industry and wool production of the world, with statistical tables of the number of sheep, the wool products of 1909, and the imports and exports of wool and woolen goods.

The egg of the fowl and its preservation by cold storage, F. LESCARDÉ (*L'Oeuf de Poule sa Conservation par le Froid. Paris, 1908, pp. 132, figs. 2*).—This book treats of the biology and chemistry of the egg, nature and causes of

the changes in eggs as they grow stale, effect of gases on the micro-organisms of the egg, methods of preserving eggs in lime, at low temperatures, and by carbonic-acid gas under pressure, and the extent of the egg industry in different countries.

The osmotic pressure of the egg of the common fowl and the changes during incubation, W. R. G. ATKINS (*Bio-Chem. Jour., 4 (1909), No. 10, pp. 480–484*).—The difference in osmotic pressure between the blood and egg led the author to study the changes in pressure during incubation with the following results: "The osmotic pressure of the egg of *Gallus bankiva*, as calculated from freezing point depressions, rises during incubation from about 5.5 atmospheres to about 7.3 atmospheres, the latter value being approximately that of the osmotic pressure of the blood of the same bird.

"Bacterial action during incubation may cause the pressure to rise to over 8 atmospheres. The view is put forward that birds are descended from organisms with an osmotic pressure of 5 atmospheres or less."

Profitable poultry (*Quart. Rpt. Kans. Bd. Agr., 27 (1908), No. 107, pp. 322, pls. 7, figs. 57, dgms. 2*).—This report is devoted to descriptions and illustrations of the land and water fowls most generally reared on American farms, with directions for their breeding, maintenance, and profitable management.

DAIRY FARMING—DAIRYING.

Swedish method of judging dairy bulls, G. LEUFVÉN (*K. Landtbr. Akad. Handl. och Tidskr., 48 (1909), No. 4, pp. 298–315*).—The author discusses the method of judging dairy bulls followed during late years by the Malmohus Agricultural Society, in which the value of the animals is determined by considering (1) the ancestors of the bull, (2) the milk or butter fat production of the dam, and (3) the conformation of the bull. The results obtained in the work of the cow-testing associations during late years supply accurate data for the production of milk and butter fat by cows and form the basis for giving credit for points under (1) and (2). Information as to the power of the bull to improve or decrease the production of their offspring is secured from these data by comparisons of the average annual production of milk and butter fat by the daughters and the dams of the daughters of the different bulls. Under (3) the size and development of the bull are considered, and the form of the different parts of the body and their relation to each other.

The standards of production given refer to the lowland breed of Swedish cattle; somewhat lower figures apply to the Ayrshire breed, the only other breed of cattle of importance in the South-Swedish counties.

Report of the Malmohus cow-testing associations, 1908–9, J. NILLSON and L. NANNESON (*Malmö. Läns. Hushåll. Sällsk. Kvrtlsskr., 1909, No. 2, pp. 314–428, pl. 1*).—The report covers the work for the year of 140 testing associations, which, with 14 others in operation a portion of the year, include over 2,400 herds with an aggregate of about 48,000 cows. The average production for all the cows was 3,452.6 kg. milk and 112.85 kg. butter fat (average fat content, 3.27 per cent), with a maximum production per association of 4,165.2 kg. milk and 139.86 kg. fat. Three of the associations have been in existence for 10 years or more, and that at Hvilan in operation for 11 years. During the 10 years the production of the 3 associations has increased, on the average, 1,002.2 kg. milk and 36.71 kg. butter per head, and at the same time the returns per 100 feed units have increased. Whereas no herd reached an average milk production of 4,000 kg. during the first year, 15 of the 40 herds in the 3 associations exceeded this production during the tenth year, and there were 18 herds below 3,000 kg. the first year,

but only 2 the tenth year. These figures indicate, in general, the influence of the work of the cow-testing associations.

Report of the work of the experiment station and dairy institute at Kleinhof-Tapiau, HITTCHER (*Ber. Vers. Stat. u. Lehranst. Molkw. Kleinhof-Tapiau, 1908–9, pp. 30*).—This report includes records of dairy cows and data on the composition of milk, manufacture of butter and cheese, and related topics.

On the value of soy bean cakes and soy bean meal for feeding milch cows, N. HANSSON (*Meddel. Centralanst. Försöksv. Jordbruksområdet, No. 15, pp. 51; K. Landtbr. Akad. Handl. och Tidskr., 48 (1909), No. 5, pp. 372–419; Fühling's Landw. Ztg., 59 (1910), No. 2, pp. 49–63*).—Feeding trials were conducted at 2 Swedish dairy farms, with 3 groups of 6 cows each at each farm. Comparison between sunflower seed cakes and soy bean cakes or soy bean meal (extracted) showed that both these feeds are well adapted for feeding of dairy cows, even in quantities of 1.5 to 2 kg. per head daily; larger quantities caused an off flavor in the butter. In feeding value 0.9 kg. soy bean cakes or 0.95 kg. soy bean meal were found equal to 1 kg. of sunflower cake.

Experiments with sugar beet pulp, N. O. H. BANG and A. V. LUND (*Ber. K. Vet. og Landbohöjskoles Lab. Landökonom. Forsög [Copenhagen], 65 (1909), pp. 62*).—A report of experiments in preserving beet pulp in trench silos and in feeding both fresh and siloed beet pulp.

The silo experiments were made at 5 different farms and were continued for a period of 3 years. The fresh pulp was placed in trenches in the field, about 3½ yds. wide and 15 in. deep, the length varying according to the amount of available pulp. The quantities of pulp ranged from 18 to 54 tons in the different trials. It was weighed and sampled as filled in the trenches and promptly covered with a layer of soil, generally about 6 in. thick, either on the day of filling, or the following day at the latest, and left for 2 to 18 months in the different trials before the second sampling and weighing took place. The quantity of the siloed pulp was excellent in all cases, a result brought about, in the author's opinion, largely by the promptness with which the pulp was covered with soil. It is noteworthy that the nitrogen in the pulp was practically all in the form of albuminoids, and that the water content of the siloed pulp was always about 0.5 per cent lower than that of the corresponding fresh pulp. The losses observed in gross weight, dry matter, and nitrogen are summarized in the following table:

Percentage losses in siloing sugar-beet pulp.

	2 months.	4 months.	6 months.	9 months.	12 months.	18 months.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Gross weight	17.8	23.9	29.4	35.4	50.2	57.7
Dry matter	13.8	19.4	24.7	31.1	48.3	51.8
Albuminoids	11.2	16.0	20.3	21.0	36.1	42.3

Pulp in the fresh and siloed condition was compared with mangels (Barres) in separate trials with milch cows conducted on 2 different farms, the cows being separated into 2 lots of 10 each. Equal amounts of dry matter in the pulp and in mangels were fed, and the quantities were larger than would ordinarily be used by Danish farmers, being, on the average, 46.1 lbs. mangels and 61.8 lbs. pulp per head daily.

The results of the various trials showed that the roots and the beet pulp possess very nearly the same feeding value, the beet pulp having a slight

advantage as regards the amount of milk produced and the gain in weight by the cows. The amount of protein in the beet-pulp rations was invariably higher and the nutritive ratios of these rations somewhat narrower than those of the root rations. According to these trials ¾ lb. mangels and 1 lb. beet pulp (either fresh or siloed) have a similar feeding value; since the dry matter content of roots decreases with the advance of the season, and that of the pulp increases, this ratio will vary with the season as well as with variations in the dry matter contents of the two feeds.

The use of by-products in feeding dairy cows, C. Porcher (*Rev. Hyg. et Méd. Infant., 8 (1909), No. 5–6, pp. 481–504*).—A discussion of the use of by-products with special reference to the production of normal milk. It is pointed out that waste from distilleries and sugar mills when fed in too large quantities may cause the milk to produce a toxic effect when used for feeding children.

Payment of milk according to its quality, O. Jensen (*Mælkeritid., 22 (1909), No. 39, pp. 831–839*).—A practical application of the author's reductase fermentation method of examination of milk delivered at creameries, previously noted (E. S. R., 21, p. 523).

On the production of sanitary milk, P. G. Heinemann, A. B. Luckhardt, and A. C. Hicks (*Jour. Infect. Diseases, 7 (1910), No. 1, pp. 47–66*).—Bacterial counts were made of milks taken at various stages in the production of "certified" milk. Separator cream was found to contain a smaller number of bacteria and separator skim milk a larger number than the whole milk from which they were obtained. The bacterial count in milk obtained by mixing the cream and skim milk from the separator is higher than that of the original milk, which bears out the theory that clumps of bacteria are broken up by the process of centrifugalizing, thus increasing the number of colonies but not the actual number of individuals. For the same reason, straining milk through absorbent cotton before bottling results in a higher bacterial count for the strained milk.

"Polymorphonuclear leucocytes of the neutrophile type, large mononuclear leucocytes, and small lymphocytes appear normally in the separator slime of the milk of healthy cows, and as far as we can see they bear no relation to the number of micro-organisms present, inclusive of streptococci.

"Eosinophiles may occur in the slime of the separator. The cause and significance of their presence remain problematical.

"The white corpuscles in milk of normal and diseased cows and in the blood of the same animals should be studied, differentiated, and classified."

There is a short discussion of the use of the score card which it is thought should be so extended as to include more items and give more detail.

Notes on milk hygiene, O. Jensen (*Mælkeritid., 22 (1909), No. 46, pp. 995–1005, figs. 2; Rev. Gén. Lait, 8 (1910), No. 3, pp. 49–60, figs. 2*).—Determinations made by the author show that the bottled whole milk sold by 4 large dairy companies in Copenhagen contained, on the average, 400,000 to 912,000 bacteria per cubic centimeter, pasteurized whole milk 76,000 to 262,000, milk intended for infant feeding 80,000 to 1,000,000, and half-skimmed pasteurized milk 237,000 to 635,000 bacteria. Raw milk sold in small city dairies and milk depots had an average bacterial content of 1,000,000 to 32,000,000 per centimeter. The following standards are suggested: For pasteurized bottled milk, less than 30,000 bacteria per cubic centimeter, and retention of color in the reductase test for at least 6 hours; all other unskimmed milk, 1,000,000 bacteria and at least 2 hours' retention of color; milk for infant feeding must in addition, if the color does not disappear within 7 hours, give no appreciable gas formation in the fermentation test.

Investigations on raw milk, J. PETERSEN (*Mælkeritid.*, *22* (*1909*), *No. 28, pp. 615–620; Milch Ztg.*, *38* (*1909*), *No. 38, pp. 447–449*).—Data on the percentages of fat, nitrogen, total dry matter, specific gravity, and other properties of milk are presented.

Ropy milk in Rhode Island, L. J. COLE and P. B. HADLEY (*Rhode Island Sta. Bul. 136, pp. 129–152*).—This is a study of an abnormal milk which acquired a ropy character in 12 to 24 hours after being set.

"Butter made from cream which was made ropy in the laboratory by inoculation with the organism showed the following characteristics: (1) It was long in 'coming'; (2) it was sufficiently viscid to adhere to the paddle during the working; (3) it had, when finished, an unfavorable (soft and sticky) consistency; (4) the flavor was unimpaired."

The apparent cause of the trouble was a micro-organism closely related to *Bacillus lactis viscosus*. This organism was unable to hold its own with other bacteria at ordinary temperatures. In laboratory experiments it was possible to produce ropiness in good milk or cream by inoculating with small amounts of pure cultures of this organism, which was also isolated in a pure culture from the white specks found in butter which had been made from the ropy milk.

A further study showed that the source of infection was not in the udder of the cow, the dust of the stable, the water supply, nor from exposure to the air in the cellar, but occurred on the straining cloth and possibly on the other utensils. The character of the organism is described in detail.

"Ropiness in milk, when once it has gained entrance to a dairy or farm, can be eliminated by the following method: (1) Wash thoroughly with soap and water, then scald and place in the sun for several hours, all utensils used in the process of handling the milk (this to include pail, strainer, straining cloths, containers, cream pans and covers); (2) during the handling of the milk keep the hands perfectly clean; (3) wash the teats and udders of the cows in warm water, each time, before milking."

A bibliography of the literature on the subject is appended.

The milk of goats and asses, C. MICHEL (*Rev. Hyg. et Méd. Infant.*, *8* (*1909*), *No. 5–6, pp. 516–540; Hyg. Viande et Lait*, *4* (*1910*), *No. 1, pp. 1–23*).—A summary of investigations on the composition and nature of the milk of goats and asses with special reference to their use as substitutes for cow's milk in human nutrition.

A study of factors influencing the composition of butter, C. E. LEE, N. W. HEPBURN, and J. M. BARNHART (*Illinois Sta. Bul. 137, pp. 315–366*).—This bulletin reports studies made in sampling butter and on the influence of temperature, pasteurization, overworking, and other factors which affect the composition of butter.

No difference was found in the water content of samples taken from the middle or either end of the churn. The average water content of samples from 52 churnings was approximately 1 per cent higher when taken from the churns than the average of all the samples taken from the tubs before storage, and there was about the same difference in samples taken from the same butter before and after storage. The average water content of 80 consecutive churnings in samples taken from the churn was 14.32 per cent, in tubs 24 hours later 13.71 per cent, and after 6 or 7 months storage 12.62 per cent. Samples from the churn also contained more water than those taken from the tray after it was printed. In tests with a trier and spatula there was no more variation in water content than between several samples taken in the same manner from one churn. As a rule there was a variation in the water content, ranging from 0.1 to 1.0 per cent, between different samples representing the same butter. The average variation was about 0.5 per cent.

Additional results obtained are as follows: "There was no variation in water content between half worked and worked butter or after the third revolution of the churn until working was completed. There was no difference in composition of butter made from cream held 1 to 3 hours and that held 12 to 15 hours at churning temperature. Butter of the same composition can be made from either pasteurized or unpasteurized cream. Dry and wet salting methods are identical as far as composition is concerned." "The percentage of water in butter is affected by the make of churn. Churning of butter washed with water differing 10° in temperature, produced butter with an average difference in water content in 40 comparisons of 1.99 per cent."

In comparing the water content of butter in the churn with that from tubs 24 hours later and from one of these tubs melted, the average water content in 12 samples was found to be from the churn 14.56 per cent, from the unmelted tubs 13.84 per cent, and from the melted tubs 14.20 per cent. In another lot of 12 samples the average water content in tubs 24 hours after packing was 13.93 per cent, from the same tub, frozen, after 6 or 7 months in storage 12.94 per cent, and from the same tub melted 13.07 per cent.

In 1907 the average butter fat content of the cream each day for 56 churnings was 452.57 lbs. and of this amount 447.15 lbs. was recovered in the butter. The only loss being in the buttermilk. From this, "it is reasonable to conclude that the tub sample quite accurately represents the average composition of the butter." In 1908 from 80 churnings the average amount of butter fat received each day was, according to the patron's test, 899.79 lbs.; by the test before the starter was added 893.2 lbs.; and by the test after the starter was added 892.71 lbs. The average butter fat recovered was according to the churn samples 883.43 lbs. and from the tub samples 892.57 lbs.

The average overrun when based upon butter fat churned was 20.5 per cent, the highest overrun being 26.7 per cent and the lowest 15.3 per cent. "The greatest factor influencing overrun obtained in creamery operation, is the sampling and testing of the milk and cream received. An error of 0.1 per cent in testing 4 per cent milk and 1 per cent in 40 per cent cream will alter the overrun 3 per cent."

As to the effect of the composition of butter upon quality, scores by 5 different judges indicate that a reasonable variation in composition does not affect quality.

Keeping qualities of butter. I, General studies, W. S. SAYER, O. RAHN, and BELL FARRAND (*Michigan Sta. Tech. Bul. 1, pp. 5–61, fig. 1*).—The investigations reported in this bulletin were undertaken to obtain basic data for further work on special problems connected with the keeping quality of butter. Twelve lots of butter were obtained in May and June from different creameries and put in storage at temperatures from +20 to —10° C. The butter was scored by experts when fresh and from time to time during storage. The history and scoring of each sample is given in detail.

With few exceptions all samples kept in storage above the freezing point had become unfit for use before November. In most cases they were very rancid, but no other flavors were noted except moldiness.

The water content of all the samples was very uniform, ranging from 12.07 to 14.67 per cent. The salt content had a greater range, from 1.06 to 3.78 per cent. These factors were thought to show no difference in the keeping quality.

The use of a starter in preparing the cream for churning appeared to have a decided influence upon the scores, for without a single exception the average scores of 8 lots where a pure culture starter was not used were lower than the

averages of the 8 lots where a commercial pure culture starter was employed. As between gathered cream and cream separated from whole milk the scores were decidedly contradictory.

The samples with high acidity came from creameries where the conditions were bad. The fat was decomposed in all samples stored at 5°. At lower temperatures different results were obtained, in some cases a distinct increase of free acids, in others only a slight decrease or increase. Acidity and score were not always related. There was no apparent relation between the total amount of free acid and the amount of volatile free acid.

"The most interesting result of our chemical analyses of butter is certainly the fact that samples which are scored rancid or even very rancid did not have the slightest increase of acidity. This seems to indicate that rancidity of cold storage butter is not connected with a hydrolysis of fat in the ordinary way, and for the same reason can not depend upon decomposition products of glycerin. It seems improbable that fat should be decomposed in any other way, since we can not conceive of an oxidation in the interior of a 60-lb. butter tub, and an anaerobic decomposition is almost impossible because of the lack of oxygen in the fat molecule."

In identifying the bacteria the classification of Conn, Esten, and Stocking (E. S. R., 18, p. 979) was used. A total of 87 different species of organisms was found, most of them only once or twice. The lactic-acid bacteria were the only organisms regularly present. The most frequent species was *Micrococcus lactis varians*. An orange variety of this species was often present in fresh butter. All of the yeasts found were nonspore producers. The most frequent molds were *Oïdium lactis*, *Penicillium glaucum*, and *Aspergillus glaucus*. In no single instance was an organism found which failed to grow well under aerobic conditions.

The lactic-acid bacteria in percentages of the total number found in fresh butter decreased fairly regularly, there being in November 14 to 17 per cent of the original number alive, and in February only 6 per cent. The decrease of bacteria seemed to be connected with the concentration of brine in the butter, though salt was not the only reason for this decrease. "The better keeping of bacteria in the high salted samples can be explained in two different ways. Probably the low salted butter was frozen in cold storage and the bacteria could no longer multiply but died slowly, as was found in the iced milk by Bischoff; whereas in the high salted butter the brine is not frozen and the bacteria have a chance for a very slow development. It may be possible, however, that the brine surrounded by fat and distributed in small drops does not solidify in cold storage. The bacteria of the low salted butters develop more rapidly and of course decrease earlier than the slower growing germs of the high salted butter." The decrease of the nonlactic bacteria in November was about the same as that of the lactics, while in February there was no further decrease but apparently a slight increase of the nonlactics. The frequency of each species is given in detail.

A small irregular yeast was the most interesting organism because of its frequency and its high number, which reached several millions in some samples. It was found comparatively seldom in fresh butter but developed in storage rapidly in spite of the cold and salt. The February examination showed a decrease in number but not in frequency. A liquefying yeast was not found in the warm storage but kept its frequency in the colder ones. A round yeast, on the contrary, grew almost exclusively on samples kept above the freezing point. A pink yeast disappeared in the coldest storages in February.

Only 4 fat-splitting organisms were found in fresh butter and none in old butter. Rancidity may have been caused in some cases by these organisms, but

in other cases the cause of rancidity was not known. "Since in the decomposition of fat all the different glycerids are usually attacked in the same way, and since less than 10 per cent of the fatty acids of butter have any taste at all, it seems improbable that the rise of acidity of 0.3°, which is the highest increase noticed in the 12 good samples, could cause a rancid taste." As there were so few fat-splitting bacteria "the question arises whether there is any other possible way of decomposing fat without the production of free acids, or whether the off flavor is mostly due to cleavage products of other substances in butter, especially of protein which certainly could give rise to strongly tasting and smelling compounds."

Pure cultures of many of the organisms found were incubated in a cold storage room at a temperature of 4 to 5° C. A large number of them were found to be capable not only of remaining alive, but also of growth and development at a comparatively low temperature, when provided with a suitable nutrient pabulum and protected from inhibitive substances.

A bibliography of the literature on the subject is appended.

Keeping qualities of butter. II, The influence of salt. III, The decomposition of proteins, O. RAHN, C. W. BROWN, and L. M. SMITH (*Michigan Sta. Tech. Bul. 2, pp. 5–44, figs. 6*).—A continuation of the work noted above.

The specific problems studied were the influence of salt upon microbial life and the changes wrought upon the proteins by micro-organisms. For this work there was obtained from a single churning four 30-lb. tubs, 2 with salt and 2 without salt, from each of 3 different creameries. One of the salted and one of the unsalted samples from each lot were placed in the laboratory storage at +4 to +10° C., and the other two in a Lansing cold storage, which maintained a temperature of —4 to —6°. Samples of both the unsalted and salted butter were also taken from the churn from which the first bacteriological and chemical analyses were made. The butter was scored at three different times, the relative scores showing that there was no hope of keeping unsalted butter for a longer time than salted butter.

The methods for making the chemical determinations are given in detail. In all samples the percentages of salt and moisture decreased, and after about 8 months of storage there was considerable difference between the fresh and the old samples. The average loss of moisture was in the 3 salted warm samples 3.67 per cent, in the unsalted warm samples 1.66 per cent, in the salted cold samples 2.73 per cent, and in the unsalted cold samples 0.99 per cent. The brine concentration was nearly constant, proving that the loss of moisture was due almost entirely to leakage, hence it is concluded that in comparing water-soluble compounds with butter more accurate results are obtained by recording them not in percentages of butter but in percentages of the moisture. This method of interpretation was used in the discussion of the soluble nitrogen, which allowed however for soluble substances only.

All samples without salt stored at +6° showed a very high increase in acidity, but notwithstanding this, the comparative scores of the salted samples at +6° are higher than those of the unsalted at —6°. Inasmuch as 2 out of 6 samples stored at —6° remained for 8 months without an increase in acidity and as they deteriorated in scores from 93 and 90 to 82 and 79, respectively, an increase of acidity is not necessarily coincident with the spoiling of butter. The soluble acids obtained from the washing of the butters constituted about one-tenth of the total acidity and ran almost parallel with it.

There was very little loss of lactose during storage, and apparently little or no relation between the water-soluble acids and the amount of lactose lost. So much lactose, especially in the unsalted warm samples which had an abundant growth of molds, was not expected. "There is, of course, a possibility

that reducing substances have been formed during the storing and that our results do not give the correct amount of lactose."

The percentage of total nitrogen increased a little, due to the loss of water that carried away the soluble substances, the nitrogenous material being in large part insoluble. In the average of all samples the total nitrogen in fresh butter was 0.072 per cent, for that stored 100 days 0.0745 per cent, and for that stored 250 days 0.075 per cent of the weight of butter.

The salted cold samples showed a comparatively slight increase in amid nitrogen. In the unsalted cold and salted warm samples the increase was slightly larger, while in unsalted warm samples it rose to from 20 to 30 per cent of the total nitrogen. Samples from the creamery with the highest scored butter had the least change. The lots scoring a little lower and made from a low quality of cream had an increased degradation of protein, while the butter with the lowest score yielded the largest amount of proteid cleavage products.

The compounds of nitrogen not precipitated by copper sulphate and also those not precipitated by phosphotungstic acid increased gradually as the butter was kept in storage. Those not precipitated by tannic acid increased and after a time decreased, but not below the initial amount. It is pointed out that possibly butter proteins in the course of degradation pass from a form that is not precipitated by tannic acid into a form that is precipitated but then again into a form not precipitated.

At short intervals the micro-organisms in the butter were counted according to the types of colonies. Only 4 species occurred with remarkable frequency, viz, lactic-acid bacteria, 2 yeasts, and *Oïdium lactis*. The 2 yeasts were the same as those in the preliminary investigations designated "rapidly liquefying" and "small irregular" yeasts. The lactics decreased from the first day of storing, at first rapidly, then more slowly. In accordance with the previous year's investigations, the decrease in the cold storage samples was larger in the unsalted samples. Above the freezing point, however, the two ran parallel, the unsalted samples having at all times about twice as many bacteria as the salted ones.

The liquefying yeast occurred frequently in the butter from two of the creameries, while in all the 34 investigations of the butter from the other creamery it was found only 5 times. It did not increase except in the unsalted samples at +6°. The nonliquefying yeast showed an increase in all butters, the numbers never very high but with a pronounced increase at all times. The unsalted warm samples had the highest counts, these amounting to 10 per cent of the lactic-acid bacteria. This yeast was not found in fresh butter and appeared on the plates only after about 10 days. *O. lactis* showed an increase in the unsalted samples but not in the salted.

Pure cultures were made with agar plates containing brine to ascertain which micro-organisms were able to multiply in the salt concentration usually found in butter. On a 12 per cent salt agar there was a good growth of various organisms. The bacteria did not thrive well, while the 2 yeasts grew abundantly, the liquefying yeast appearing in about 2,000 cells and the nonliquefying in about 30,000 cells per gram of butter. *O. lactis* was found in about the same number as the nonliquefying yeast. After 3 months of storage the butter was plated in a 24 per cent salt agar and 20,000 cells of the nonliquefying yeast were found per gram of butter. Other cultures showed that the resistance of the nonliquefying yeast to unfavorable conditions as salt and cold, and even with the two combined, is remarkable. It was able to thrive at a temperature of —6°, even though its growth was retarded by salt. "Whether this yeast has anything to do with the off flavor of cold storage butter is questionable. It occurs

in so small numbers, about 10,000 to 50,000 per gram at the highest, that it could hardly cause any material chemical changes. Besides it grows very slowly in sterile milk, producing no apparent change except a slight alkalinity. But the texture of butter is quite different from that of milk, and changes may occur under such conditions which never take place in skim milk."

A bibliography of the literature on the subject is appended.

The keeping of butter in cold storage. II, The influence of salt. III, The decomposition of protein in butter, O. RAHN, C. W. BROWN, and L. M. SMITH (*Centbl. Bakt.* [*etc.*], *2. Abt.*, *26* (*1910*). *No. 1-3, pp. 47-54, fig. 1*).—A condensation of the work noted above.

Handling of cream and making of butter on the farm, C. E. LEE (*Illinois Sta. Circ. 131, pp. 10*).—This circular presents specific directions as to handling cream and making good butter on the farm.

Report on permanent Finnish butter exhibits, 1907, A. ANDELIN ET AL. (*Landtbr. Styr. Meddel., 1908, No. 58, pp. 41*).—Data on 1,077 tubs of butter which were scored and examined for water content, refractive index, and water-soluble fatty acids are presented.

The Wisconsin butter and cheese scoring exhibitions, E. H. FARRINGTON and M. MICHELS (*Wisconsin Sta. Bul. 182, pp. 3-42, figs. 2*).—This is an account of the butter and cheese scoring exhibitions begun by the station in 1907.

During the first year a total of 1,399 entries of butter and 778 of cheese were made from 254 creameries and 195 cheese factories. "The value of the exhibitions is shown by the experience of exhibitors, stated in letters received from them, and especially by the higher scores received by exhibitors in comparison with others at various dairy shows, state fairs, etc."

Causes and remedies for butter and cheese defects are also outlined in this bulletin on the basis of data used in connection with the scoring exhibits.

New cheese forms, C. N. DANIELS (*Daily Cons. and Trade Rpts.* [*U. S.*], *1910, No. 3680, p. 9*).—An account of a small cheese recently put on the English market and sold last year under the name of "Wensleydale," weighing from 1 to 1.25 lbs., and about 3.5 in. in diameter. This method of presenting cheese to the consumer was an experiment but appears to have been a success, as this year they are seen in far greater number. The advantage claimed is that the cheese is less liable to contamination from atmospheric or surrounding conditions than is the larger cheese with its exposed cut surface, and is less liable to dry up while being consumed in the home. It is proposed to sell this cheese in the future under the name of "Wenslet."

VETERINARY MEDICINE.

Report of the civil veterinary department, Eastern Bengal and Assam, for the year 1908-9, W. HARRIS ET AL. (*Rpt. Civ. Vet. Dept., East. Bengal and Assam, 1908-9, pp. 2+20+4*).—This report covers the subject of veterinary instruction, treatment of disease, breeding operations, etc. The mortality from contagious disease among equines is reported to have been 229 against 301 for the previous year.

Of the contagious diseases of bovines, rinderpest was prevalent throughout the entire province, causing a total mortality of 44,126. Foot-and-mouth disease was reported from 19 districts, causing 11,852 deaths; hemorrhagic septicemia from 19 districts, causing 8,040 deaths; black quarter from 6 districts, causing 565 deaths; and anthrax from 11 districts, causing a mortality of 2,954. Other contagious diseases caused 17,939 deaths, but particulars were not available. Tables are given which show by districts the number of deaths from contagious

diseases among animals, the results of preventive inoculation, the number of animals treated at veterinary hospital and dispensaries, and other data.

Annual report on the Punjab Veterinary College and of the civil veterinary department, Punjab, for the year 1908–9, W. RENOUF (*Ann. Rpt. Punjab Vet. Col. and Civ. Vet. Dept., 1908–9, pp. II+13+XIII*).—This report consists of 7 parts of which the first 3 are devoted to veterinary instruction, treatment of disease, and breeding operations.

During the year under report 145,808 cases of epidemic disease were reported of which 56,111 proved fatal. Of deaths from equine contagious diseases 224 were reported against 107 in the previous year, 163 being from surra as compared with 90 in the previous year. A serious outbreak of glanders in one locality was effectually stamped out. Of the 17,247 cases of rinderpest 8,739 died, as against 3,531 cases and 1,714 deaths in the preceding year. Contact animals were inoculated against this diesase in 270 outbreaks, 60,258 animals being treated. Hemorrhagic septicemia was reported from every district in the province except two, the total number of deaths reported being 20,822 out of 26,082 animals attacked. Foot-and-mouth disease was reported from every district, 70,606 cases being reported of which 1,241 died. Black quarter was reported from 18 districts, with 965 cases and 721 deaths. There were performed 2,606 vaccinations in infected premises with the most satisfactory results. Of deaths from anthrax 628 were reported in 15 districts. The large number of deaths of bovines reported under the head of other contagious diseases, of which there were 8,895, was due mainly to the existence of gillar, or parasitic disease, in the Lahore and Sialkot districts. There were 14,781 deaths from contagious diseases in other animals, mainly among goats and sheep, the greatest mortality being caused by the gillar disease.

The need of controlling and standardizing the manufacture of veterinary tetanus antitoxin, J. R. MOHLER and A. EICHHORN (*U. S. Dept. Agr., Bur. Anim. Indus. Bul. 121, pp. 22*).—Because of the divergent results which have been obtained from the use of veterinary tetanus antitoxin, it has not gained the favor of the veterinarian and is not used to the extent merited. It having been suggested that the lack of uniform results is primarily due to the variation in the strength of the product, the standardization of veterinary tetanus antitoxins prepared by different manufacturers and a determination of the variation in the strength of these products was undertaken. Following an account of the nature and cause of tetanus and a historical summary including the mode of action, toxicity, and stability of tetanus antitoxin, its standardization is taken up, the European and American methods explained, and the results of examinations of 13 samples of commercial veterinary antitoxin prepared by 4 different companies reported.

From the results of these tests the following conclusions are drawn:

"The veterinary tetanus antitoxins prepared by the different manufacturers have not a uniform potency, and the variation amounts in some instances to about two-thirds less than the strength which it should possess. In order to insure a uniform strength, the manufacturers of veterinary tetanus antitoxins should be required to use the American standard, and to state on the label the number of American units the dose contains, as is required for human tetanus antitoxin. The immunizing dose for a horse should contain at least 1,500 immunity units of the standard established by the United States Public Health and Marine-Hospital Service. It is seen that the veterinary tetanus antitoxins vary extravagantly in the unit strength, and some are comparatively weak in antitoxic potency, which shows the necessity for the same supervision by the United States Department of Agriculture over biological products used in veterinary medicine as is now exercised by the United States Public Health and

Marine-Hospital Service over similar products used in human medicine. The request for such supervision should have the indorsement of the veterinarians and live-stock interests of this country."

Cocaine and adrenalin as local anesthetics, DUPUIS and VAN DEN ECKHOUT (*Ann. Méd. Vét., 58 (1909), No. 11, pp. 615–621; abs. in Vet. Rec., 22 (1909), No. 1117, pp. 376, 377; Jour. Compar. Path. and Ther., 22 (1909), No. 4, pp. 358–360*).—The authors highly recommend the combination of adrenalin with cocaine or similar agents to induce local anesthesia in the horse. A solution consisting of hydrochlorate of cocaine, 0.25 to 0.30 gm., hydrochlorate of adrenalin (1 in 1,000) 5 drops, and distilled water, 10 gm., suggested by the authors, is said to be useful in diagnosing lameness in the lower portions of the limb. Though stovaine and alypine are perfectly efficient substitutes for cocaine the authors do not see that they are in any way preferable to it.

A contribution to our knowledge of the physiological action of tutin, F. FITCHETT (*Trans. New Zeal. Inst., 41 (1908), pp. 286–366*).—Investigations made on the action of the pure principle tutin ($C_{17}H_{20}O_7$) confirmed the results of previous observers that it is in itself sufficient to account for the main bulk, if not the whole, of the symptoms of poisoning by the tutu plant.

"The tutu plant belongs to the natural order Coriarieæ, a small order of very doubtful relationship possessing but a single genus, Coriaria. The genus includes some 8 or 10 species, and has a rather remarkable distribution, species being met with in south Europe, South America, China, Japan, north Africa, India (Himalayas), and New Zealand." These plants (*Coriaria ruscifolia* and *C. thymifolia*) have been the source of a great loss of sheep and cattle in New Zealand. The American species, *C. thymifolia*, and the New Zealand species are said to be identical. All parts of the plants are poisonous, but their young shoots are more toxic than the leaves and fruit. Experiments upon the action of tutin on mammals, birds, reptiles, amphibia, insects, etc., are reported.

New trypanosomes, C. CHAGAS (*Arch. Schiffs u. Tropen Hyg., 13 (1909), No. 1, pp. 120–122; abs. in Sleeping Sickness Bur. [London], Bul. 7, pp. 250, 251*).—Two new trypanosomes (*Trypanosoma minasense* and *T. cruzi*) are described. The former was found in a marmoset (*Hapale penicillata*), while the latter was found regularly in the intestine of a bug (*Conorrhinus* sp.). Trypanosomes were found in a marmoset 20 to 30 days after specimens of this bug had been placed upon it. The trypanosome was not found in other monkeys and the author believes that the marmoset is not the usual host. The dog, guinea pigs, and rabbit were experimentally infected.

A new species of Trypanosoma in man, C. CHAGAS (*Bul. Soc. Path. Exot., 2 (1909), No. 6, pp. 304–307; abs. in Sleeping Sickness Bur. [London], Bul. 8, p. 300*).—In continuation of the above work, the author has been unable to determine the species of Conorrhinus which transmits *Trypanosoma cruzi*. Its bite is said to be very painful. It feeds on the domestic animals as well as man and the author has several times found *T. cruzi* in them. The disease in man is called Opilacaô and has hitherto been regarded as ankylostomiasis. Children, who were attacked by the disease which the author believes is due to this trypanosome, have their development arrested.

Trypanosomiasis of mammals in French Congo, J. KÉRANDEL (*Bul. Soc. Path. Exot., 1 (1908), No. 8, pp. 515–519; abs. in Jour. Trop. Med. and Hyg. [London], 12 (1909), No. 10, p. 154*).—In the regions visited by the author trypanosomiases are the principal causes of mortality among horses and cattle. The forms most commonly met with are *Trypanosoma dimorphon* and *T. congolense*, which he has found in horses, and still more frequently in cattle in Higher Sangha, Mid-Loyone, and the middle valley of the Ouhama. *T. cazalboui* was found in cattle which had become infected in the last-named district

and also in Higher Sangha; in the latter case associated with *T. dimorphon*. *T. pecaudi* was noted in horses in Ouhama, and it seemed most probable that they had been infected through the agency of *Glossina morsitans*.

The existence of Trypanosoma dimorphon or a similar species in Mozambique and Zululand, A. THEILER (*Bul. Soc. Path. Exot., 2 (1909), No. 1, pp. 39, 40; abs. in Sleeping Sickness Bur.* [*London*], *Bul. 5, p. 203*).—The author has found a trypanosome in cattle at Chai-Chai, Mozambique, which had been in perfect health for 6 years. This trypanosome is pathogenic in the dog, white rat, rabbit, sheep, goat, ox, horse, and mule. Morphologically the parasite resembled *T. dimorphon* and *T. congolense*. The same parasite has also been taken from a horse, which was infected in Zululand.

A new trypanosome from South Africa, A. THEILER (*Bul. Soc. Path. Exot., 2 (1909), No. 7, pp. 392–395; abs. in Sleeping Sickness Bur.* [*London*], *Bul. 9, pp. 343, 344*).—The author gives a description of the morphology and animal reactions of *Trypanosoma dimorphon*, noted above. Severe anemia with changes in the red cells was produced in cattle, sheep, goats, rabbits, and white rats. The infection is acute in the rat, acute or chronic in the rabbit and dog, and chronic in the ox, sheep, and goat, and in equines. The author concludes that the parasite is morphologically identical with *Trypanosoma congolense* but differs in an essential point, its virulence for guinea pigs.

Transmission of spirilla and piroplasms by various species of ticks, A. THEILER (*Bul. Soc. Path. Exot., 2 (1909), No. 6, pp. 293, 294; abs. in Jour Trop. Vet. Sci., 4 (1909), No. 4, pp. 602, 603*).—The author presents a brief review of the subject.

Natural infection of the proboscis of Glossinæ, E. ROUBAUD (*Bul. Soc. Path. Exot., 1 (1908), No. 9, p. 564; abs. in Jour. Trop. Med. and Hyg.* [*London*], *12 (1909), No. 10, p. 157*).—The author has already shown (E. S. R., 20, p. 789) that the evolution of trypanosomes ingested with infected blood takes place immediately within the proboscis. Coincident with this, another development is observed consisting of active multiplication within the intestinal tube which brings about an infection of the entire intestine and the proboscis, where the trypanosomes behave as true parasites.

Note on the occurrence of marginal points, or a new intracorpuscular parasite, in the blood of cattle in South Africa, J. SPREULL (*Jour. Compar. Path. and Ther., 22 (1909), No. 4, pp. 354–357*).—The author here reports 2 cases of this affection in calves observed in East Griqualand, South Africa, both of which recovered.

"The fever and jaundice symptoms induced me to take a blood smear from the calf's ear. Microscopic examination after fixing and staining the film by Giemsa's method revealed marked blood changes, consisting in poikilocytosis, polychromasia, and basophilia, and the presence of many normoblasts. The blood anemia had evidently existed for some time, yet no piroplasm or trypanosome was seen either now or later. Attention was soon drawn, however, to the presence within a considerable number of the red cells of one or more tiny spherical violet-black or blue-black spots, whose protozoic nature was indicated by their staining reactions. These spots or points varied in size, but were never more than one-thirtieth to one-twentieth the size of the red corpuscle, sometimes situated on the edge of the cell, sometimes in its substance, but generally toward its margin. Often there were two points, placed close together and looking like a dividing coccus, or more widely apart, at opposite sides of a red cell. Even three such bodies were occasionally seen in a red cell, and a very few appeared to be free in the plasma. In staining reactions these points closely resembled the nucleus of a normoblast, but their tiny size made them at once readily distinguishable."

This parasite was also observed in the blood of a yearling heifer suffering from piroplasmosis, due to *Piroplasma mutans*. Two references to this disease by A. Theiler are mentioned.

Ratin bacillus and Bacillus enteritidis, F. LEBRAM (*Centbl. Bakt.* [*etc.*], *1. Abt., Orig., 50* (*1909*), *No. 3, pp. 315–318; abs. in Jour. Roy. Micros. Soc.* [*London*], *1909, No. 6, p. 761*).—The author has studied the ratin bacillus and finds that it bears a strong resemblance to *B. enteritidis*, both in pathogenic and cultural characters.

A contribution to the biology of the glanders bacillus, W. STICKDORN (*Centbl. Bakt.* [*etc.*], *1. Abt., Orig., 50* (*1909*), *No. 1, pp. 5–22*).—The author finds that the virulence of the glanders bacillus is lowered by prolonged cultivation on nutrient media. After passing through white mice the virulence is maintained for these mice but is slightly lowered for gray mice. When passed through pigeons the virulence is retained for pigeons and increased for gray mice.

Contagious equine pneumonia, B. MALKMUS (*Jour. Compar. Path. and Ther., 22* (*1909*), *No. 4, pp. 308–321*).—A paper presented at the Ninth International Veterinary Congress at the Hague, September, 1909.

This disease, known in Germany as Brustseuche, is described as a contagious fibrinous inflammation of the lungs of the horse, with implication of the body parenchyma, and generally accompanied by secondary pleurisy. The actual cause has not as yet been determined, bacteriological investigations having failed to implicate any of several suspected organisms. There is said to be a diversity of opinion as to whether contagious equine pneumonia constitutes a separate disease or is merely a form of contagious influenza (equine pasteurellosis). It is not possible to transmit the infection experimentally from one animal to another by any means.

While peculiar to the horse, it affects all breeds and types of horses. The greatest predisposition to the disease is by horses between the ages of 5 and 10 years. Foals are rarely attacked. "When a horse in any large stud is attacked with contagious pneumonia and is allowed to remain in the stud the disease as a rule soon spreads to some of the other inmates of the stable. . . . When the disease propagates rapidly the causal organism loses in virulence, and, indeed, often to such a degree that in the last of the animals attacked the disease is so mild that it is scracely possible to recognize it. . . .

"The period of incubation is, as a rule, from 5 to 10 days, but it is frequently less, and sometimes not more than 3 or 4 days. In many cases, however, 14 days elapse before the disease breaks out. . . . The causal agent brings about an inflammation of the lungs with pronouncedly infectious characters, and at the same time determines parenchymatous alterations in all the organs of the body. . . .

"When both the general and the local symptoms are fully developed the diagnosis of contagious equine pneumonia is easy. In horses there is no other disease of the lungs which is associated with such severe general symptoms, and especially with such striking blood changes. . . . The statistics show that of the horses attacked with contagious equine pneumonia in the Prussian army from 3 to 5 per cent die. This small proportion of fatal cases is mainly ascribable to good care and treatment. In the larger towns the average loss is very much greater and reaches up to 20 per cent. Unfavorable stable conditions, working the horses after they are attacked, and delayed treatment are responsible for this high mortality. One observes extraordinary differences in different outbreaks, the disease being sometimes mild, and at others more virulent and fatal. . . . Contagious equine pneumonia is an acute infectious disease, which runs a typical course, as a rule ends in recovery, and leaves

the recovered animal with an immunity that is as a rule lifelong. These facts make it permissible to hope that some artificial method of immunizing horses against the disease will be discovered. . . . When contagious equine pneumonia runs a typical course therapeutic treatment is really not necessary. It suffices to take such means as are possible for preventing complication and sequelæ."

Researches on the immunization against tuberculosis, H. Vallée (*Rec. Méd. Vét., 86 (1909), Nos. 19, pp. 623–639; 21, pp. 689–693; 23, pp. 794–799*).—Previously noted from another source (E. S. R., 22, p. 185).

A discussion of De Renzi's treatment of somatic tæniasis with male fern, and some tests of the treatment in gid, M. C. Hall (*Amer. Vet. Rev., 36 (1909), No 3, pp. 328–337*).—In view of reports by De Renzi of an apparently successful treatment of somatic tæniasis in man by the administration of repeated doses of male fern, experiments were conducted at the experiment station of the Bureau of Animal Industry of this Department in order to determine the effect of the drug on the parasite of gid in sheep (*Cœnurus cerebralis*).

"Of the 3 cases of sheep treated by this method, the diagnosis of the disease and the failure of male fern as a remedy was confirmed in all by post-mortem examination. At least 1 of the 3 sheep received a very fair and adequate test of the remedy, and the total failure of the remedy in this case is in accordance with the supposition that in the human cases reported by De Renzi the improvement in the condition of the patients was due to some other cause than the assumed action of male fern upon encysted larval cestodes."

A case of psoroptic mange in the dog, Hebrant and Antoine (*Ann. Méd. Vét., 58 (1909), No. 12, pp. 696–698; abs. in Vet. Rec., 22 (1909), No. 1119, pp. 406, 407*).—The case here reported is believed to be the first to appear in veterinary literature. It is said that the dog may have been infected through contact with the domestic rabbit.

Bacillary white diarrhea of young chicks, L. F. Rettger and F. H. Stoneburn (*Connecticut Storrs Sta. Bul. 60, pp. 33–57, figs. 7*).—In continuation of investigations previously noted (E. S. R., 20, p. 386; 21, p. 586), a historical review is presented, followed by an account of the symptoms and post-mortem appearance, and a description of *Bacterium pullorum* and its general characteristics. The investigations were limited to a determination of the original source of infection by *B. pullorum* and to the possibility of the transmission of the disease through the food supply.

A thorough bacteriological examination of the exterior of the shells of 12 eggs gave negative results, but the yolk of one was found to contain *B. pullorum*. An examination of the yolks of 86 eggs which had been incubated for longer or shorter periods and the majority of which contained embryos in various stages of development, showed that 8 contained the organism in large numbers and apparently pure, and 5 were questionable. While this lot of 86 eggs came from 11 different varieties of fowls, it was noted that all the infected eggs came from the Buff Orpingtons and Rhode Island Reds. On another occasion 16 eggs were examined, none from Rhode Island Red hens, and the results were negative. Of 23 hens killed 21 were found to have pathological ovaries and from 9 of 20 examined pure cultures of *B. pullorum* were obtained.

Of 280 chicks, representing several varieties, hatched and brooded by both natural and artificial methods, the total mortality to the age of 5 weeks was 36 chicks, or 13 per cent, and the total deaths from natural causes, 29 chicks, or 10 per cent. When, however, 50 chicks as taken from the incubator were given a few drops of a water suspension of *B. pullorum* by means of a medicine dropper, the same water suspension being also added to the drinking water and

to dampen a part of the food, this resulted in the death of 34, or 68 per cent. Another lot of 180 chicks were given a similar treatment when 2 or 3 days of age, and the total mortality in 4 weeks was 23 chicks, or approximately 13 per cent.

A third lot of 196 chicks, when about 24 hours old, was given a few drops of bouillon culture of *B. pullorum* and this material was also used in the drinking water and to dampen 2 feeds per day for 10 days. All the symptoms of bacillary white diarrhea were soon observed. The chicks had poor appetites as compared with those in noninfected or control lots and there was a high mortality. During the first month the loss in infected lots was 57 chicks, or 29 per cent, against 16 chicks, or 8 per cent, in the control lots. At 1 month of age the surviving chicks were weighed and the controls were found to be 17 per cent heavier than the infected lots. At 8 weeks of age the comparative loss in the infected lots was 94 chicks, or 47 per cent, and in the control lots 33 chicks, or 17 per cent. Both stunted and large chicks were found in each lot but, as a rule, the large well-developed chicks were found among the controls and those weak and stunted in the infected lots. In about 75 per cent of the dead chicks from the infected lots which were examined, *B. pullorum* was found.

In another experiment, 11 strong chicks were given subcutaneous injections of the pure culture of the organism, and a mortality of 100 per cent resulted, the organism being found in the internal organs of every chick examined.

Although the investigations are stated to be far from complete, the author considers the data secured sufficient to warrant the following conclusions:

"The mother hen is the original source of infection of the chick. A certain percentage of the chicks on infected farms have the disease when hatched. The disease may be induced by subcutaneous injection of chicks with pure cultures of the organism, and transmitted through infected food supply. The mortality depends upon the virulence and numbers of the organism, the mode and time of infection, and doubtless upon the vitality of the chicks. While a large percentage of infected chicks die under 4 weeks of age, some may survive the infection. These are likely to be weak and stunted, and seem particularly susceptible to other disorders."

Suggestions as to possible means of prevention are appended.

A new spirochetosis of fowls in Senegal caused by Spirochæta neveuxi n. sp., E. BRUMPT (*Bul. Soc. Path. Exot., 2 (1909), No. 6, pp. 285–288; abs. in Jour. Trop. Vet. Sci., 4 (1909), No. 4, p. 602*).—This new species is based on the slight variations in morphology from *Spirochæta gallinarum*. In the differentiation the author relies chiefly on physiological differences and states that by cross immunity it is easy to demonstrate that fowls cured of one infection are capable of contracting the other. The parasite is inoculable to the fowl, duck, goose, and Java sparrow.

A leucocytozoon of the fowl, C. MATHIS and M. LEGER (*Compt. Rend. Soc. Biol. [Paris], 67 (1909), No. 31, pp. 470–472*).—In addition to the Microfilaria and Trypanosoma found in the blood of fowls in Tonkin as previously noted (E. S. R., 22, p. 189), the authors report the discovery of a Leucocytozoon to which they give the name *Leucocytozoon caulleryi*. Of 216 fowls examined at a single time the blood of four contained this parasite.

RURAL ECONOMICS.

Concerning the causes of the increased cost of living (*Land. u. Forstw. Mitt., 11 (1909), No. 24, pp. 219–221*).—This article presents statistics on the market prices of various farm products for a number of years and discusses their bearing on the increased cost of living, the paper being published as

the official findings of a committee of the German section of the agricultural council of Bohemia.

Contrary to the popular opinion that the farmer is reaping the benefit of the increased price of farm products, it is pointed out that the cost of raising meat, dairy products, and other goods has steadily increased so that as a matter of fact the farmer gets less returns for his labor to-day than he did a few years ago and the agricultural industry is becoming less profitable from year to year. This result is due to the increased price farmers have to pay for labor and necessary supplies while receiving no higher price for their own products. If any increased profit is made, it is reaped by the middleman and not by the farmer. The general economic tendency of the increased price of agricultural products has been to involve wage-earners in debt. It is the opinion of the committee, with which the whole section concurs, that for the government to encourage agriculture is not only to make provision for a sound and vigorous population but also to provide itself with unlimited means of support.

The economic limits of intensive culture in agriculture, B. BAURIEDL (*Österr. Ungar. Ztschr. Zuckerindus. u. Landw., 38 (1909), No. 3, pp. 317–325*).—This article discusses the economic limits under which successful farming can be conducted, the purpose being to show that there are many factors affecting the cost of raising products which, when certain limits in the expenditure of capital and labor have been reached, can not be passed in any system of intensive culture without a diminution in net returns to the producer.

Among the factors mentioned are the system of management, crops raised, location of the house and buildings on the farm, distance of the farm from markets, farm work animals, wages of laborers, utilization of manures, and the raising of live stock. It is maintained that, if a farmer knows all the elements of cost entering into any particular farm undertaking, he will so regulate his operations as to yield the largest net returns, and that a good farm manager never loses sight of this ultimate end of his labor.

Farm labor and the cost of production, P. G. CRAIGIE (*Irish Farming World, 22 (1909), Nos. 1131, p. 1103; 1132, p. 1128; 1133, p. 1147; 1134, p. 1175*).—This is a discussion of the classes of farm labor in the United Kingdom, the changes in wages, the use of machinery, the cost of keeping farm stock used in operating a farm, and the bearing of these data on the cost of producing farm products.

Farm labor in Mexico, C. M. FREEMAN (*Daily Cons. and Trade Rpts.* [*U. S.*], *No. 3660, p. 9*).—A brief statement is given as to the economic conditions under which farm tenants work in the province of Durango.

Corn raising is described as a very profitable feature of farming in that province. The renter signs a contract to give the landowner one-half the produce clear of all expenses. The corn is husked by men who get 50 cts. Mexican per day each, and the expense is charged to the renter whose field is being worked. After all accounts are settled, the corn is divided evenly between owner and renter. "However, little is coming to the renter besides enough to last him until spring, and often the ranch owner has to commence selling to the renter, as early as February, corn at a big profit, the corn to be credited on the next season's crop. Corn taken from renters at husking is credited at $3.50 Mexican per hectoliter [about 62 cts. per bushel]. Corn sold to renters in the spring brings $5 to $5.50 Mexican per hectoliter."

The social and economic position of city and farm laborers, A. HOFFMEISTER (*Illus. Landw. Ztg., 29 (1909), No. 89, pp. 831–833*).—This is a comparative study of the relative economic and social conditions of laborers in Berlin, Hamburg, and smaller cities of Germany and of farm laborers in different parts of the country.

The results of the investigations by the author as well as those of Heiser-Hartung, Muhlert, and Hasse are summarized and topically discussed. The value of the article consists in the fact that the data on the income, expenditures, and standard of living of more than 200 families are secured from those who had forsaken farm life in the hope of improving their condition in the city. This hope had not been realized, particularly on the part of those who were married, though the unmarried were in some instances better off in the cities than in the country. Statistics are presented to show that the average annual expenditures of these city workers ranged from 183 to 592 marks (from \$43 to \$142) more than their incomes. The investigations also showed that their standard of living, dwellings, and other social features had not been improved by removal to the cities.

In contrast with the actual conditions of these city families, the economic position of a large number of rural families is described with statistics showing the extent of their savings. From these savings the farm laborer has frequently been able to rent or buy a farm and thus improve his social condition.

As a result of these investigations the author concludes that country life and not city life furnishes the better prospect for the economic and social uplift of the laboring class.

Concerning the insurance of farm laborers against accidents at their work (*Bol. Quind. Soc. Agr. Ital., 14 (1909), No. 22, pp. 1028–1032*).—This article summarizes the legislation and describes the present status of agricultural insurance against accident in France, Austria, Germany, England, Belgium, Italy, and other European countries, the amounts of indemnity and to whom paid, the methods of fixing responsibility and adjusting differences in cases of dispute, the kinds of societies that insure, and other matters pertaining to voluntary and compulsory insurance. Data on Switzerland have already been noted (E. S. R., 22, p. 91).

Minor articles of farm equipment, L. W. Ellis (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 44, pp. 15*).—This paper presents a summary in tabular form of the inventories of minor equipments found on 33 farms in Ohio averaging 167 acres in size, and the data are discussed with a view of showing the relative importance and the cost of the various items for a properly equipped, average-size general farm. The information is believed to be of practical value not only to experienced farm owners and tenant farmers, but also to the prospective farmer who engages in agriculture for the first time.

This study does not include wagons, machinery, or other articles which on account of bulk or value would be classed as items of major importance, but is confined to miscellaneous small tools, utensils, and sundries usually purchased at a small cost for each. The total cost of 158 such articles regarded as necessary is \$270.70, and it is suggested that before buying the farm equipment, "due consideration should be given to the necessary outlay for minor items, and where possible the latter should be secured at one purchase, thereby saving time and, usually, money. The purchase of these articles in such a manner will mean a total expenditure sufficient to impress the farmer with the need for their systematic care. The minor items for a general farm of 160 acres in Ohio and other middle Western States will probably cost from \$200 to \$300."

Agricultural cooperation, G. Radford (*London, [1909], pp. 74*).—This book discusses the chief uses and advantages of cooperation in the purchase of farm requisites such as seeds, feeding stuffs, fertilizers, and implements, the cooperative collection, transportation, grading, and sale of such farm products as milk, meat, poultry, and eggs, and cooperative credit banks, finance, and insurance. The book deals with English conditions, cooperation being urged as

a means of improving the economic position of rural workers and of meeting colonial and foreign competition with higher class goods of home production.

Mutual insurance of live stock (*Bd. Agr. and Fisheries [London], Leaflet 221, pp. 7*).—The methods of establishing mutual societies for the insurance of pigs and cattle against loss from disease and other causes, with recommendations relating to rules for the best management of such societies, are given in this pamphlet.

Agricultural credit in Mexico, J. M. Balboa et al. (*Bol. Soc. Agr. Mexicana, 33 (1909), No. 46, pp. 904–916*).—This is a report of a committee appointed by the Central Chamber of Agriculture for the purpose of considering the present status of agricultural credit in Mexico with a view to making suggestions as to its improvement.

The different kinds of agricultural credit banks in operation in other countries are discussed with reference to their economic limitations so far as the peasant farmer is concerned. The committee believes that the district banks are the most effective as an agricultural credit institution and should be established throughout Mexico. Changes in the Mexican laws with reference to credit banks to correct present defects are presented, and the differences in social and economic conditions which prevail in Mexico as compared with European countries are discussed with a view of justifying the committee's recommendations as to the best form of credit banks adapted to Mexican conditions. Mutual credit associations are believed to be the last form that could be established in Mexico with any prospect of success.

Agricultural credit in Mexico (*Bol. Soc. Agr. Mexicana, 33 (1909), No. 48, pp. 947, 948; 34 (1910), Nos. 1, pp. 3–6; 3, pp. 43, 44*).—Reviews of the committee's report noted above, some of which are reprinted from other Mexican journals.

Agricultural credit in Mexico (*Agricultor [Yucatan], 4 (1910), No. 37, pp. 5, 6*).—A review of the committee's report noted above.

In regard to agricultural credit, G. Chappez (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 30 (1909), No. 46, pp. 593–597*).—This article discusses the relations existing between the Bank of France, the district banks, and the local mutual credit banks or associations with regard to the rates of interest charged by the banks to borrowers. The arguments advanced by the two schools of advocates for lowering or maintaining the present rates of interest are presented and discussed with reference to their bearing on the economic position of farmers. The author favors a rate of interest ranging from 2 to 2.5 per cent, which only seems feasible by the formation of large numbers of local banks grouped together into circumscribed districts, thus reducing the expenses of operation.

Mutual agricultural credit in Algeria in 1908 (*Off. Gouvt. Gén. Algérie Bul. Bimens., 15 (1909), No. 23, pp. 356–359*).—Statistical data are presented and discussed relating to the number of district banks, number of affiliated local banks, rates of interest charged, number of loans granted, etc., in Algeria for 1908, in comparison with similar data for preceding years.

International Institute of Agriculture, A. Boyer (*Rpt. Min. Agr. Canada, 1909, pp. 124–129*).—This is an account by the Canadian delegate of the proceedings, organization, resources, and work of the institute.

Crop Reporter (*U. S. Dept. Agr., Bur. Statis. Crop Reporter, 12 (1910), No. 1, pp. 1–8*).—Notes and statistics on the condition of crops in foreign countries and on the farm values, monthly marketing by farmers, and range of prices of important farm products in the United States are reported. A special article discusses the importance of accurate farm records for the forthcoming census.

AGRICULTURAL EDUCATION.

Higher agricultural instruction in Austria and Hungary, H. J. B. v. Roijen (*Cultura, 21 (1909), No. 256, pp. 666–671*).—A brief review of the establishment and organization of the Agricultural High School at Vienna, and of the agricultural academies at Altenburg, Debreczen, Kassa, Keszthely, and Klausenburg, is followed by a comparison of these institutions with the Wageningen Agricultural High School as regards the number of hours devoted to theoretical and practical instruction in the various studies taught, the cost of attendance, and the number in the faculty.

French traveling agricultural domestic science schools, A. Ducloux (*3. Cong. Nat. Indus. Lait., 1908, Raps. et Compt. Rend., pp. 160–187*).—Previously noted from another source (E. S. R., 20, p. 92).

First annual report of the Congressional district agricultural schools of Georgia, J. S. Stewart (*Bul. Univ. Ga., No. 114, pp. 48, figs. 22, map 1*).—The letter of transmittal of this bulletin summarizes the first year's work of the Georgia district agricultural schools as follows: Total attendance, 1,001; acres under cultivation, 738; gross receipts from farms, $16,050; value of buildings and grounds, $732,000. The bulletin itself furnishes a complete list of the trustees and teaching staffs of each school, a history of their establishment, and a description of the several buildings, farms, equipment, student activities, daily program, and the 4-year course of study.

Agriculture in the high schools, L. Anderson (*California Sta. Circ. 47, pp. 3–18*).—A survey of the present status of agricultural instruction in certain public high schools of California, the courses offered in the State Polytechnic School at San Luis Obispo and the University Farm School at Davis, and a suggested 4-year course in agriculture adapted to correlation with the first 2 years of the usual high-school course and to specialized study in the last 2 years. A partial list of bulletins, circulars, and books on agriculture is appended.

The correlation of high-school science and agriculture, J. Main (*Addresses and Proc. Nat. Ed. Assoc., 47 (1909), pp. 983–987*).—A carefully elaborated plan for correlating school science and agriculture to the end of securing greater pedagogical economy in the teaching of both, furnishing the pupil a broad, scientific basis for further vocational study, and the integrating of agricultural instruction with the usual public school curriculum, is presented.

The present status of agricultural education in the public schools, E. C. Bishop (*Addresses and Proc. Nat. Ed. Assoc., 47 (1909), pp. 976–982*).—A comprehensive review from the origin of the school-garden movement in Germany to the present status of school agriculture in the various States of this country in respect to legislation, public sentiment, and the educational results and advantages, is given.

Agriculture for the elementary schools, R. O. Johnson (*Addresses and Proc. Nat. Ed. Assoc., 47 (1909), pp. 987–992*).—This paper is based upon a recognition of the necessity of furnishing teachers a definite course and method for school agriculture. It proposes a "rotation" course of nature study and agriculture for the first 6 grades and an advanced course for grades 7 and 8. One-sixth of the lower course is given each year to all of the 6 grades working together as one section, and the entire course is thus covered in 6 years. The advanced course is similarly covered in 2 years by the combined seventh and eighth grades.

The advantages suggested for this plan are that it limits the amount of new work which the teacher must do each year, permits a detailed outline of the work to be furnished by some State educational authority, and is adapted to

the varying number of grades in rural schools. Thus a school or room of 3 grades would repeat its agricultural course once in 3 years. The "development method" is advised in the treatment of each topic of instruction so as to relate the study as closely as possible to the pupil's individual knowledge and interest.

Some means of awakening and maintaining an interest in agricultural education, E. E. BALCOMB (*Addresses and Proc. Nat. Ed. Assoc., 47 (1909), pp. 959–964*).—A paper filled with concrete illustrations of means and methods of teaching elementary agriculture and domestic science in correlation with other school work.

The opportunity of the agricultural college library, MARY G. LACY (*So. Atlantic Quart., 9 (1910), No. 1, pp. 78–82*).—The author holds that one of the most important functions of the agricultural college library is to disseminate information concerning the nature of its classified permanent and periodical literature on agriculture, manual training, domestic science, and kindred subjects. It is stated that at present the aggregate mailing list of all the State experiment stations is but 500,000, or only 5 per cent of the total number of families living in agricultural districts. The remedy suggested is the development of a classified mailing list in the interest of the various industries peculiar to the sections of each State.

The agronomic chart and its popular use, O. STEINEL (*Mitt. Deut. Landw. Gesell., 25 (1910), No. 1, pp. 3–5*).—The more general use of such charts in the schools is advocated.

Pruning, W. PADDOCK (*Agr. Col. Ext. Bul. [Ohio State Univ.], 5 (1909), No. 3, pp. 4–11, figs. 15*). Reasons and directions for pruning young and old trees are given in a form suitable for study in public schools.

Composition, nutritive and manurial values of farm foods (*Leeds, 1909, Folder*).—This is a table issued by the University of Leeds, and the Yorkshire Council for Agricultural Education, and approved by the Agricultural Education Association as suitable for the purpose of teaching.

MISCELLANEOUS.

Twenty-eighth Annual Report of Ohio Station, 1909 (*Ohio Sta. Bul. 205, pp. XXVIII, pl. 1*).—This contains an announcement concerning the work of the station, the organization list, a report of the board of control, a financial statement for the fiscal year ended June 30, 1909, and a report of the director summarizing the work of the station during the year.

Summary of experiment station work, E. A. BRYAN (*Washington Sta. Popular Bul. 20, pp. 7*).—A reprint from the report of the station for 1907 previously noted (E. S. R., 22, p. 94).

Press bulletins (*Ohio Sta. Bul. 205, pp. 298–306*).—Reprints of press bulletins on the following subjects: The wheat jointworm; lime and clover; treating seed wheat to prevent stinking smut; how to combat the wheat jointworm; late blight and rot fungus of potatoes; Alaska wheat; selection of seed corn; fire prevention and control; bark beetles or bark borers; the wheat jointworm; and a field meeting at the experiment station.

Yearbook of agriculture (*Jahresber. Landw., 23 (1908), pp. XXXII+564*).—This volume contains numerous abstracts of articles on plant and animal production, agricultural machines, agricultural economics, and allied topics.

NOTES.

Arkansas University and Station.—A. K. Short has resigned as animal husbandman to become principal of the newly established agricultural school in the Second Congressional District.

Colorado College.—H. M. Bainer, professor of farm mechanics and instructor in dairying, has also been appointed general manager of the college farms.

Illinois University and Station.—According to a recent compilation as to the pursuits followed by the alumni of the college of agriculture during the past ten years, 115 of the total of 184 graduates are engaged in farming, 40 are connected with the agricultural colleges and experiment stations, 7 are with this Department, and another is an agricultural editor, making about 90 per cent connected with the agricultural industry.

Two seed and soil special trains have been recently sent out, the speakers being provided from the college and station.

Iowa College.—Press reports announce the resignation of President Storms, to take effect August 31. H. G. Bell, assistant professor of farm crops, has resigned to accept the professorship of agronomy at the University of Maine.

Kansas College.—The extension department is offering movable schools in dairying, grain, and stock judging, gardening, and cooking and sewing, applications having been received from a number of localities in the State. The schools began work March 1 and will be carried on for three months, the various courses continuing from three days to one week. A member of the extension department is in charge of each school, and is assisted by graduate students of the college specializing in the respective lines. A fee of $1 is charged for each course to defray local expenses. The usual special trains are also being sent out, the subject under consideration this spring being corn.

The *Kansas Farmer* announces the organization of what is known as the "Manhattan Guild," for the purpose of providing summer employment to the students along the lines which they expect to follow after graduation.

Maine Station.—On March 9 the station celebrated its twenty-fifth anniversary. A large number of the friends of the institution were present, including representatives from the various agricultural organizations of the State. The chief address was given by Director Jordan, of the New York State Station, who was, it will be recalled, the first director of the Maine Station.

Massachusetts College.—Great activity along extension lines is being manifested and is meeting with hearty response from the people of the State. The second annual farmers' week recently held at the college offered a wide range of courses, taking up such topics as corn improvement, alfalfa in New England, principles of breeding, use of fertilizers, the home vegetable garden, fruit-growing, forestry, milk testing and dairying, meat production in New England, the gipsy and brown-tail moths, plant diseases, controlling infectious diseases of animals, floriculture, and home economics. Several of these courses are a distinct innovation at the college, notably those on home economics. In addition to the regular college staff, the speakers included Mrs. Ellen H. Richards, Miss Anna Barrows, Miss Isabel Bevier, Miss Helen Louise Johnson, Dr. Austin Peters, Prof. T. N. Carver, of Harvard University, Director Clinton, of the Con-

necticut Storrs Station, and Dr. David Snedden, secretary of the state board of education.

It is announced that the trustees have voted to accept offers from the Boston and Albany Railroad and the electric roads centering in Springfield to run agricultural educational trains, and have offered to cooperate with the state board of agriculture, the Boston Chamber of Commerce, and other organizations for the purpose, tendering the services of the instruction staff and placing at the disposal of the railroads such equipment and apparatus as may be required. The first of these trains was sent out over the lines of the Boston and Albany Railroad March 30 to April 2. Demonstrations and lectures were provided, one unique feature being an exhibition by the state forester of forest fire fighting apparatus.

Demonstrations in practical orcharding are to be undertaken. The plan contemplates securing plats of 4 or 5 acres, convenient to trolley lines. The trees will be furnished by the college to the farmers who agree to carry out the directions for from 10 to 15 years, at the end of which period the college withdraws from the orchard entirely. Plats in run-down orchards are also to be renovated.

Minnesota University and Station.—Sydney M. Owen, a member of the board of regents from 1893 to 1901 and again since 1907, died February 2, aged 73 years. Mr. Owen was for many years editor of *Farm, Stock and Home*, and through its columns and in other ways rendered much assistance to the college and school of agriculture and to the station.

J. S. Montgomery, formerly connected with the Cuban Station, has been appointed assistant animal husbandman in connection with the stallion registration.

Mississippi Station.—S. F. Blumenfeld has been appointed assistant entomologist.

Montana College.—Short courses in fruit growing have been offered for the first time in the State through the agency of the farmers' institute schools for fruit growers, held at Hamilton and Stevensville, January 10 to 15. The courses were largely given by members of the college and station staff.

North Dakota College.—The new veterinary building has recently been completed, and much of the equipment has been installed. The building is so constructed as to form essentially three separate structures, the dissecting room and the hospital being connected with the main portion by inclosing corridors. The interiors are very largely of metal and concrete, and the dissecting room is so arranged as to admit light from all directions. A special feature is the killing room, which is equipped with all the appliances of a modern slaughterhouse.

Ohio Station.—An agreement has been entered into between the station and the Bureau of Plant Industry of this Department, for cooperative tobacco investigations during the current season. Albert G. Wood, a graduate of Indiana University, has been appointed assistant botanist.

Oregon Station.—A dry farming substation has been established at Moro, in the eastern portion of the State, in cooperation with the Bureau of Plant Industry of this Department. H. J. Umberger has been placed in charge of the work as superintendent.

Rhode Island College and Station.—At the annual meeting of the Agricultural Experimental Union, recently held in Providence, results of the first year's experiments were discussed. The assistant agronomist of the station was chosen secretary for the ensuing year.

Vermont University.—A successful farmers' week was held February 14–18, which was attended by about 250 students, mostly practical farmers and dairymen.

Wyoming University.—Movable schools of agriculture have been conducted at Wheatland, Basin, and Buffalo in addition to the regular eight weeks' short course at the university.

Experiment Station at Oaxaca, Mexico.—Plans have been completed for an experiment station at Oaxaca, Mexico. This will constitute the third experiment station to be established under the direct supervision of the Federal Government of Mexico through its department of the interior, its predecessors being those established at Rio Berde, in the State of San Luis Potosi, in 1906, and at Ciudad Juarez, on the northern frontier, in 1908.

A tract of several hundred acres has been acquired in the heart of the sugar district and containing several of the more common soil types of the region. An irrigation system has been installed, and extensive orchards of peaches, olives, oranges, and other fruits have been set out. Buildings are projected to cost over $100,000, including offices, laboratories, a dairy and poultry plant, residences for the director and other employees, warehouses, etc. An experimental sugar mill, operated by electricity, is already completed.

Special attention is to be given in the experimental work to the introduction, acclimatization, and distribution of valuable plants from other sections of Mexico and other countries, and to a study of the production and manufacture of sugar. The instruction of some of the employees of neighboring estates in improved methods is also contemplated.

The directorship of the station has been intrusted to Felix Foix, who has studied agricultural methods in France, England, the United States, and Mexico, and has been engaged for the past ten years in experimental work in tropical agriculture in Mexico. Juan Martinez has been appointed subdirector and Emanuel S. Blanco and Jose M. Ortega additional members of the scientific staff.

The Virginia Association of Agricultural Schools.—Under this title an organization was effected at Richmond, November 24, 1909, of those interested in the development of the new state system of agricultural high schools. The officers for the coming year include Director S. W. Fletcher, of the Virginia Station, as secretary-treasurer. Each principal, agricultural teacher, or director in the ten state agricultural high schools is an ex officio vice-president of the association, and these with the elective officers constitute the executive committee. It is expected that the state board of education and the president of the Virginia Polytechnic Institute will soon establish an authorized agricultural course for these schools.

State Agricultural School at Morrisville, N. Y.—F. G. Helyar, for 4 years head of the agricultural department of the Moody School for Boys at Mount Hermon, Mass., has been elected principal of the new agricultural school at Morrisville, N. Y. The buildings formerly used for the county court and offices of Madison County are to be at once arranged for class rooms and an auditorium, domestic science work, dairy laboratory, mechanical shops, and principal's residence. Greeenhouses will be erected near the shops.

Smith's Agricultural School.—A somewhat unique meeting of the Connecticut Valley Breeders' Association was held at this school January 25. Lectures and practical demonstrations were given by George M. Rommel, of the Bureau of Animal Industry of this department, and Charles W. Bosworth, a horse breeder on an extensive scale, the auditorium and arena being utilized for the exercises. Lunch was furnished by the domestic science classes of the school, and extensive exhibits of its various industrial phases were on view. About 500 people were in attendance, to most of whom the illustration in concrete form of the functions of a school of this type was a distinct revelation.

New England Conference on Rural Progress.—At the fourth annual meeting of this conference at Boston, March 4, addresses were given by President K. L.

Butterfield and Prof. W. D. Hurd, of the Massachusetts Agricultural College, and Dr. S. A. Knapp, of this Department, on the organization of New England associations for advancing agricultural education. Other speakers included Prof. Floyd B. Jenks, of the Massachusetts Agricultural College, State Superintendent of Education Henry C. Morrison, of New Hampshire, President Howard Edwards, of Rhode Island College, and Principal R. W. Stimson, of Smith's Agricultural School.

A decision was reached by the conference to concentrate its energies in the future mainly upon a single problem each year. For the ensuing year participation in the New England Corn Show, to be held at Worcester, Mass., in November, will be given special attention.

Agricultural Conference in New York.—An important meeting of the New York State Agricultural Society was held at the capitol at Albany, January 18–20, at which this body was reorganized and a strong program presented to the 250 members in attendance.

The general subject was: What is Being Done and What Needs to be Done in New York State for the Advancement of Agriculture, Especially Along Educational Lines, and the papers were as follows: What the State Fair is Doing to Advance the Agricultural Interests of New York State, by Lieutenant-Governor Horace White; Agencies and Conditions Essential to Agricultural Efficiency, by Director Jordan, of the New York State Station; The Agricultural Situation, by Dean Bailey, of Cornell University; A New Movement for the Advancement of Agriculture in Northern New York, by Dean Herbert E. Cook, of the State School of Agriculture at St. Lawrence University; What Could be Done for the Advancement of Agriculture on Farms in Connection with State Charitable and other Institutions? by Hon. Dennis McCarthy, fiscal supervisor of state charities; Educational Aids to Improved Horticulture and Improved Animal Industry, by the respective presidents of the State Fruit Growers' Association and the State Breeders' Association; Instruction in Agriculture in Western New York, by President Boothe C. Davis, of Alfred University; Aids to Agricultural Advancement in the Middle West, by Dean E. Davenport, of the Illinois College and Station; Agricultural Education, by President Jacob G. Schurman, of Cornell University; Improved Methods of Agriculture, by President William C. Brown, of the New York Central Lines; The Farmers' Institutes, by Edward Van Alstyne, conductor of farmers' institutes; The Farmer's View of Agricultural Education, by Frank N. Godfrey, master of the State Grange; Schools of Agriculture, by D. J. Crosby, of this Office; and Should the Public Schools Teach Agriculture, by Thomas E. Finegan, of the state education department.

Among the resolutions adopted were those deprecating the establishment in New York at this time of separate schools of agriculture, advocating the teaching of practical agriculture in existing high schools, favoring the utilization so far as practicable of county farms and the farms of the various state penal and charitable institutions as demonstration farms for the benefit of their respective communities, and appointing a committee to confer with the governor, legislative leaders, and those in charge of educational work in the State, with a view to formulating a definite policy in its work in agricultural education.

The Country Church and Agriculture.—It is announced in *New England Homestead* that Rev. C. O. Ormsbee, of Lenox, Mass., has arranged a course of lectures by specialists on various phases of rural life. Profs. W. P. Brooks and W. D. Hurd, of the Massachusetts Agricultural College, have already given lectures, the former discussing agriculture in Japan and the latter corn production. Other members of the faculty are to participate later.

International Agricultural Exhibition in Argentina.—A clause in the urgent deficiency appropriation act recently passed by Congress, authorizes the participation by the United States in this exhibition, which, as previously announced, will open in Buenos Aires on June 3. An allotment of $30,000 has been made to this Department, which is preparing an exhibit of its work.

First International Congress of Entomology.—A movement is under way to organize a purely entomological congress to hold triennial sessions about a fortnight before the meetings of the International Congress of Zoology. In accordance with this plan, the first of these congresses has been called to meet in Brussels, August 1–6, during the International Exposition and preceding the Eighth International Congress of Zoology, at Grätz, Austria. The subjects to be considered include systematic entomology, nomenclature, anatomy, physiology, psychology, ontogeny, phylogeny, ecology, mimicry, etiology, bionomy, paleontology, zoogeography, museology, and medical and economic entomology.

International Horticultural Congress.—In connection with the forthcoming International Exposition, an International Horticultural Congress will convene in Brussels from April 30 to May 3. The congress will be organized in seven sections, namely: Floriculture, pomology, market gardening, scientific horticulture and its popularization, the economics of horticulture, landscape gardening, and apparatus and special machinery. The program also includes excursions to numerous points of interest.

Second International Congress of Alimentary Hygiene and of the Rational Feeding of Man.—The place of meeting of this congress has been changed from Versailles, as previously announced, to Brussels, October 4–8, under the auspices of the Belgian Government. Dr. H. W. Wiley, of this Department, is acting as the American representative of the Congress.

Necrology.—Alexander J. Bondurant, agriculturist at the Alabama Station from 1892 to 1896 and for much of this time professor of agriculture in the Alabama Polytechnic Institute, died at Lynchburg, Va., March 6, aged 74 years.

J. J. H. Gregory, well known as a seedsman, of Marblehead, Mass., and as a writer upon squashes and other vegetables, died February 20, at the age of 83 years.

Dr. Thomas Taylor, microscopist in this Department from 1871 to 1895, died in Washington, D. C., January 21, at the age of 90 years.

Miscellaneous.—The Fifteenth International Congress of Hygiene and Demography, which was to have been held in this country during 1910, has been postponed until 1911 or 1912, at a place to be selected by the President of the United States.

The first winter institute for farmers to be offered by the Florida Agricultural and Mechanical College for Negroes was held at Tallahassee January 10–13, with a large attendance.

The University of Melbourne has recently inaugurated a course in agriculture, with W. A. Osborne, now professor of physiology, as dean of the faculty of agriculture.

Ronald V. O. Hart Synnot has been appointed director of the department of agriculture and horticulture in University College, Reading, vice Professor Percival, who has been promoted to the chair of agricultural botany.

O

EXPERIMENT STATION RECORD.

Editor: E. W. ALLEN, Ph. D., *Assistant Director*.
Assistant Editor: H. L. Knight.

EDITORIAL DEPARTMENTS.

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FIELD CROPS.

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NOTE.—The publications of the United States Department of Agriculture may be purchased from the Superintendent of Documents, Washington, D. C., to whom all remittances should be made. The price of *Experiment Station Record* is $1 per volume, and there will be two volumes each year. The prices of other technical publications are given above. The publications of the State experiment stations are distributed from the stations and not from the Department.

EXPERIMENT STATION RECORD.

Vol. XXII. May, 1910. No. 6.

The injurious effect which often follows the feeding of cotton-seed meal to certain kinds of live stock has been a subject commanding much attention from the experiment stations almost from their establishment. The loss which has followed cotton-seed meal feeding, especially with pigs and calves, has detracted greatly from the use which could be made of this exceptionally rich material, and has made a better understanding of its physiological effect a matter of the greatest importance. For obvious reasons it has been recognized as one of the live problems of the stations in the Southern States, and the desirability of a wider and more safe utilization of this home product has lent a special zeal to the investigation. It has been made a prominent project under the Adams fund at a number of places.

These studies have been pursued from the standpoint of the chemist, the veterinarian, and the animal feeder. Chemical investigations have been made to discover if possible the character of the toxic body, and extracts of various kinds have been examined as to their composition and their toxicity. The symptoms of affected animals have been extensively observed; and a great variety of feeding experiments have been made with different mixtures and methods of feeding, in the attempt to get a clue to the nature of the difficulty and the practical means of avoiding or overcoming it. It has been variously ascribed to the lint, the oil, the high protein content, to a toxalbumin or toxic alkaloid, to cholin and betain, to resin present in the meal, and to decomposition products.

But despite the amount and diversity of the study, the cause and nature of the toxicity have continued to baffle investigators, and the problem has been greatly confused by variations in the toxicity or an entire absence of it, difficult to account for on the ground of individuality of the experimental animals. At an interesting stage in the study it would be found that the animals did not seem to be seriously affected by eating the meal in considerable quantities, and in certain localities injury was far less prevalent than in others. These things have served to interrupt the investigations, to make the point of attack more difficult to discern, and to lend complexity to the whole problem.

It is a matter for congratulation, therefore, that the cause of the poisoning and the reason for the variation in this respect now appear to be explained by studies which have been going on in the Bureau of Animal Industry of this Department, under Dr. John R. Mohler, and are now announced in a preliminary way. The laboratory and pharmacological studies have been conducted by Dr. Albert C. Crawford, who in an article which has just appeared describes the method of procedure which was followed in studying this problem, and presents his deductions as to the causative agent.[a]

To the surprise of many, Dr. Crawford finds the poisonous principle not to be an alkaloid, and probably an inorganic rather than an organic body—a salt of pyrophosphoric acid. Phosphoric acid has long been known to be present in cotton-seed meal in considerable quantity, and has been suggested as having a possible relation to its toxicity; but the methods of study followed have not been such as to bring out this relationship or lend support to the hypothesis.

Dr. Crawford's results seem conclusive, and are supported by a large amount of data from a systematic series of laboratory studies and physiological tests. The findings have been confirmed by feeding experiments with pigs, carried out by the Bureau, which are not presented in the preliminary paper. These feeding and pathological studies, together with the laboratory investigations, are to be published later as a bulletin of the Bureau. The preliminary notice is issued at this time because of the interest in the progress of the work which has been manifested by several of the experiment stations now engaged in studying the problem. The present account is sufficiently detailed and comprehensive to indicate the character and scope of the investigation, and it will make it possible for other investigators in this field to redirect their studies and to coordinate them with those of the Bureau.

Starting with the product which would be digested by the animal, that is, the extract prepared by digesting cotton seed with pepsin and pancreatin, the extract was concentrated and studied in its toxic effects on rabbits. Whole cotton seed of known origin was used in a number of cases, which was first ground and extracted to remove the fat. The same variations in toxicity which had been noticed in other experiments were encountered. It was found that while the seed from Upland cotton was quite generally poisonous to animals, that from certain Sea Island cotton contained so small a quantity of the poisonous principle as to be practically harmless. The toxic effect of the Sea Island seed, however, was greatly increased by heating, indicating that if in the treatment of the seed at the oil mills the

[a] Jour. Pharmacol. and Expt. Ther., 1 (1910), No. 5, pp. 519–548.

temperature rises high the poisonous principle is developed. This is due to a conversion of part of the orthophosphoric acid into the pyro form, a reaction familiar to chemists.

This explains in an interesting way the differences which have been observed in the meal from different mills. Several experiment station workers have expressed the belief that the process of manufacture often has an important relation to the poisonous properties of the seed. At one station pigs were fed continuously and heavily on cotton-seed meal from a nearby mill without the slightest injury being apparent, but when a change was made to a lot of meal shipped in from an adjoining State cases of poisoning soon followed. Less easily explained is the observation of Dr. Crawford that Sea Island seed grown in Florida proved poisonous even without heating, approaching in this respect certain varieties of the Upland cotton. This remains for further investigation.

In the study of the extract containing the digestive products, it was found that lead and copper acetates precipitated a toxic agent which gave the usual symptoms of cotton-seed meal poisoning when fed to rabbits, while the filtrate from this precipitate remained inactive. On decomposing the lead precipitate with sulphuretted hydrogen and concentrating in vacuo, a red gummy material was obtained which fed to rabbits produced an intense gastro-enteritis and induced death in about an hour. From this material crystalline needles were obtained after standing about eight weeks, but these crystals proved physiologically inactive, while the gummy matrix continued to produce the poisonous effects, suggesting that the active principle was an amorphous body. One after another suspected compounds were eliminated from consideration and the active principle was shown not to be a toxalbumin, a glucosid, and probably not an alkaloid. But it yielded precipitates with ammonium molybdate, magnesia mixtures, and the acetates of such metals as lead, mercury, and cadmium, indicating the presence of some form of phosphoric acid, which ultimately proved to be the case. The substance responded to reactions for pyrophosphoric acid, which is known to have poisonous properties, and is a soft glassy mass crystallizing only at low temperature and after months of standing.

It is interesting to note that as far back as 1892, Prof. M. B. Hardin, of the South Carolina Experiment Station, reported the finding of both meta and pyrophosphoric acid in all of a series of samples of cotton-seed meal which were examined in his laboratory. He says of their presence: "The salts of the last two acids are said to be more or less poisonous, and though their precise physiological action has not I believe been determined, it is quite possible that some of the peculiar and in certain cases injurious and even fatal effects produced by the use of cotton seed and cotton-seed meal as feeding

stuffs may be due, in a measure at least, to the presence of these meta and pyro compounds." In a paper before the Association of Official Agricultural Chemists in that year he mentions the finding of these two forms of phosphoric acid in aqueous solutions of cotton-seed meal, and raises the question whether they exist in the original cotton seed or are formed as a result of the process of the preparation of the meal.

Dr. Crawford refers to Professor Hardin's work, and notes the absence of any pharmacological tests to bear out the suggestion made in regard to the relation of these bodies to cotton-seed poisoning. The matter appears not to have been followed up by that station until last June, when a project was entered upon with that work and hypothesis as its starting point.

A variety of confirmatory experiments were conducted by Dr. Crawford, together with studies on the nature of the compound, and pharmacological tests with sodium salts of the three forms of phosphoric acid. His final conclusion is that "the chief poisonous principle in certain cotton-seed meals is a salt of pyrophosphoric acid. In some this salt seems to be a simple one, presumably inorganic, while in others it is more complex, perhaps an organic one. Probably this difference in the combinations of pyrophosphoric acid may aid in explaining the variation in toxicity of different meals. In certain cotton-seed meals one would expect to find salts of metaphosphoric acid entering into this action. To be harmful the pyrophosphates must be in such a form that they can be absorbed, or the phosphoric acid ionized in the gastro-intestinal tract. The harmlessness of certain cotton seeds and meal is mainly due to the fact that in them the phosphoric acid exists largely, if not entirely, as a compound of ortho, and not as one of the other phosphoric acids. Small amounts of pyrophosphates can apparently be borne without injury. The amount of the salt which may be permitted in cotton-seed meal should be determined."

Aside from the avoidance of too high heating in manufacture, the author does not suggest a remedy for this difficulty in feeding cotton-seed meal. He points out that "at present it would seem to be the wisest course to test each lot of meal by a combined biological and chemical method, and if any excess of poisonous properties is present, to utilize such meal for fertilizing purposes or use for feed with the greatest caution, and reserve for more indiscriminate feeding those which prove harmless to experimental animals."

This work suggests a line of study upon the relation of the character of the soil, etc., to the production of the poisonous body in cotton seed, the part which fertilizers may play, the influence of microorganisms, and an inquiry as to whether the pyrophosphoric acid is derived from the soil or is due to a physiological process in the seeds. The possible relation of cholin or similar bodies as contributory

causes would also seem to be in order. Furthermore, "the question as to whether pyrophosphates will induce a hypersensibility and thus increase the activity of pathogenic organisms should be investigated."

The importance of this discovery as a contribution to our knowledge regarding cotton-seed meal as a feeding stuff will be generally recognized. But beyond this the study will make possible and suggest a whole train of studies upon various ingredients of feeding stuffs in their relation to the animal organism. The desirability of investigations starting out from this point of view has been previously referred to, and is illustrated by several studies now in progress.

The session of the Graduate School to be held this summer at the Iowa State College bids fair to be one of unusual interest in a number of respects. It offers an attractive program of advanced study in a variety of subjects, and is held in a typical region, at one of the best equipped agricultural colleges in the country.

This is the fourth session of this school, held under the auspices of the Association of American Agricultural Colleges and Experiment Stations. The undertaking is cooperative between the association and the institution at which the sessions are held, and is designed to furnish facilities for a brief period of advanced study in the science of agriculture with special reference to the methods of investigating agricultural problems and teaching agricultural subjects. The first session was held at Ohio State University in 1902, the experiment being so successful that a continuance of the school seemed desirable. Provision was therefore made for its continuance by the association, the plan being to hold sessions every two years. The second session took place at the University of Illinois in 1906, and the third session at Cornell University in 1908.

With each succeeding session this school has assumed increasing importance as an agency for study and for meeting the leaders in agricultural instruction and investigation. The attendance has increased steadily, that at the last session being one hundred and sixty-four students and seventy-eight lecturers. The enthusiasm has run high, and the spirited discussions and personal contact have served to make the time both inside and outside the class room very profitable. The change of instructors each week brings a new lot of men upon the scene, and has the effect of keeping up the interest throughout the session. To instructors and hearers alike the sessions have been stimulating and helpful, as well as informational, and to the younger assistants entering agricultural college and experiment station work the schools have afforded an exceptional opportunity for broadening their grasp and coming to know many of the prominent men in these lines of work.

The scope of the session held this summer will be broader than ever before. Instruction will be given in eight main lines—plant physiology and pathology, agronomy, horticulture, animal husbandry, poultry, dairying, rural engineering, and rural economics and sociology. The courses in rural engineering and in rural economics and sociology will be given for the first time. Work along these lines is developing rapidly in the agricultural colleges, and the Graduate School therefore affords an opportune occasion for discussing the organization of such courses and the development of research in these lines.

The course in plant physiology and pathology will be so arranged as to enable all students interested in these subjects to attend. For this purpose a different hour has been given to courses in agronomy and horticulture, which will run parallel, and will be more closely confined to topics relating directly to these subjects respectively.

In view of the large interest at present in matters relating to agricultural extension, a relatively large amount of time will be given to a discussion of the functions and organization of extension departments, their relation to the experiment stations and teaching departments, etc. Four evenings and one Saturday forenoon will be devoted to this work. University extension in general will be presented by Director Reber of the University of Wisconsin and President Sparks of Pennsylvania State College; and the present status of agricultural extension education in this country and abroad will be shown by Prof. John Hamilton of this Office.

At one of the conferences there will be discussion of the sphere of agricultural extension, its special problems, organization, methods and equipment of extension departments, and the means for qualifying extension leaders and teachers. Among the speakers will be President Butterfield of Massachusetts, Dean Davenport of Illinois, Dean Hunt of Pennsylvania, President Soule of Georgia, Superintendent Miller of Kansas, Professor Christie of Indiana, and Professor Holden of Iowa. In connection with this conference it is hoped to have a general meeting of the leaders in agricultural extension.

Agricultural journalism will be considered at one of the Saturday conferences, where the matter will be presented by representatives of leading agricultural journals and men in the agricultural colleges who are giving courses of instruction in this subject. Conferences will also be held on secondary education in agriculture and on the relation of agricultural education to the business of farming.

The faculty of the school is an unusually strong one and is gathered from all parts of the country. It includes over forty specialists in the agricultural colleges, experiment stations, and this Department, together with Dr. D. T. Macdougal, director of the department of botanical research, of the Carnegie Institution, Prof. J. S. Pray, pro-

fessor of landscape architecture in Harvard University, Dr. W. E. Castle, professor of zoology at Harvard, Dr. C. W. Gay, professor of animal husbandry in the University of Pennsylvania, Prof. G. E. Day, of the Ontario Agricultural College at Guelph, and Prof. F. H. King, formerly in charge of agricultural physics in the University of Wisconsin.

There will be two lecturers from abroad: Dr. E. von Tschermak, professor of plant breeding in the Royal Imperial Agricultural College at Vienna, and Prof. J. C. Ewart, of the University of Edinburgh, Edinburgh, Scotland. The former is widely known for his investigations in cereal breeding and the latter for his work upon the principles of animal breeding, including telegony. These two distinguished foreigners will add interest and scope to the courses in plant and animal breeding.

The sessions of the school will open July 4 and continue to July 29. Public opening exercises will be held on the evening of July 6 in the new agricultural building of Iowa State College. It is expected that several associations, representing different lines of agricultural instruction and research will hold meetings in connection with the school, probably immediately before or after the session.

Arrangements have also been made to hold another session of the Graduate School of Home Economics at Ames during the sessions of the Graduate School of Agriculture. One matriculation fee will admit students to both of these schools.

The vast agricultural interests of the region in which this session of the school is to be held, and the unparalleled prosperity of agriculture throughout the Middle West, will afford to those who attend this session many opportunities for observations of unusual interest to students of our agriculture. The recent broadening of the scope of agricultural research, and the rapidly awakening interest in broader problems of agricultural economics and country life, will also contribute to the interest and success of the school.

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RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

Allen's commercial organic analysis, H. LEFFMANN ET AL. (*Philadelphia, 1909, vol. 1, 4. ed., pp. X+576, figs. 86*).—This volume has been so extensively revised that it is practically a new book. A new feature introduced in this edition is the division of the topics among various writers and a new arrangement of these topics. Two new chapters have been added, one on yeast and one on paper and paper making materials. The subject of cellulose nitrates has been transferred to the section on smokeless explosives of volume 2, which is to follow, and the examination of malt has been transferred to the section on malt liquors. The decimal system has been used throughout except in special instances where conformation to the standards established was necessary. The edition is to have 8 volumes, the first few of which are stated to be now in press.

Chemical-technical analysis, G. LUNGE and E. BERL (*Chemisch-technische Untersuchungsmethoden. Berlin, 1910, 6. ed., rev. and enl., pp. XIX+674, figs. 163; Sup. pp. 72*).—This is the first volume of the sixth edition of this work, and has been entirely rewritten and enlarged. Aside from a description of the sampling, general laboratory operations, and general chemical and physical analytical methods, it includes gas analyses, examination of solid fuels, the manufacture of sulphuric acid, the chemical control of the process, etc., nitric acid manufacture and chemical control, analyses of the products, soda manufacture and chemical analyses of products, chlorin and its products, etc., potassium and the various potassium compounds and the analytical methods therefor.

Aids to the analysis of food and drugs, MOOR and PARTRIDGE (*London, 1909, 3. ed., pp. 249*).—The authors state that in preparing this revision the volume has been practically rewritten. It has been their intention, as heretofore, to prepare a volume of moderate size devoted to the analysis of food and drugs, with special reference to the needs of those who are engaged in the examination of such materials.

The chemistry of foods and condiments, J. KÖNIG (*Chemie der Menschlichen Nahrungs- und Genussmittel. Berlin, 1910, vol. 3, pt. 1, 4. rev. ed., pp. XIV+772, figs. 405*).—This volume is a continuation of work previously noted (E. S. R., 15, pp. 283, 991). It confines itself chiefly to the general methods of analysis and considers the following: Preparation of the sample; determination of water; general physical methods, which includes determination of specific gravity, melting point, cryoscopy, electrical conductivity, calorimetry, polariscopy, refractometry, spectroscopy, colorimetry, microscopy, micro-chemical analysis, and capillary analysis; elementary analysis; detection, determination, and separation of nitrogenous bodies; separation and determination of the amino acids and other cleavage products of the proteins; detection and determination of ptomaines; separation and determination of the flesh bases; differentiation

of the proteins by means of specific sera; determination of fat and oils, determination and separation of nitrogen-free extract substances; separation and determination of organic acids; determination and separation of mineral substances; determination of alcohols; detection of coloring matters in foods and condiments; qualitative and quantitative detection of preservatives; mycological examination of food stuffs; utilization of foods by the human being; respiration experiments; animal calorimetric investigations; and numerous tables.

Handbook for the manufacture of colors, G. Zerr and R. Rübencamp (*Handbuch der Farbenfabrikation. Berlin, 1909, 2. ed., rev. and enl., pp. XVI+878, figs. 90*).—This is a treatise on the manufacture and analysis of the inorganic and organic coloring matters. The descriptive portions are of particular interest.

The relation of colloid research to agricultural chemistry, P. Ehrenberg (*Ztschr. Chem. u. Indus. Kolloide, 3 (1908), No. 5, pp. 193–206; abs. in Chem. Zentbl., 1909, II, No. 17, p. 1488*).—The author draws attention to the colloidal chemical processes which occur in agrotechny, viz, in baking, starch manufacture, brewing, alcohol and yeast production, and sugar manufacture.

The present status of colloid chemistry, A. Lottermooser (*Ztschr. Angew. Chem., 22 (1909), No. 50, pp. 2417–2423*).—This is a description of colloid chemistry and considers many matters pertaining to it in the light of modern knowledge.

Principles and results of plant chemistry, II and III, H. Euler (*Grundlagen und Ergebnisse der Pflanzenchemie. Brunswick, 1909, pp. VIII+297, figs. 8*).—This continues the work previously noted (E. S. R., 20, p. 906). The second part confines itself to the general laws controlling plant life, that is, the laws of gases, osmotic pressure, electrolytic dissociation, solubility, colloids, plant enzyms, etc. The third part considers the chemical processes in the plant, that is, the assimilation of carbon, nitrogen, nitrites, nitrates, ammonia, and mineral substances, carbohydrates and fats, the end products of metabolism, etc.

The vegetable proteins, T. B. Osborne (*London and New York, 1909, pp. XIII+125*).—This is a timely discussion of the general chemical and physical properties of the vegetable proteins. As stated in the preface, it was the intention of the author to present a general description of these proteins as a group or class rather than to consider them individually. Among the subjects discussed are a historical review, the occurrence of proteins in the different parts of plants and their general characteristics, the isolation and preparation of seed proteins, the basic and acid properties of proteins, the solubility, precipitation, denaturing, physical constants, products of hydrolysis, and classification of vegetable proteins, some physiological relations of vegetable proteins to the animal organism, and the biological relations of seed proteins to one another. An extensive bibliography is appended.

Peptic digestion of casein from the standpoint of the acidity of its digestion products, S. Küttner (*Arch. Physiol. [Pflüger], 129 (1909), No. 10–12, pp. 557–602*).—In the proteolysis of casein phosphorus-free and phosphorus-containing compounds are split off. The former can be split off under the most unfavorable conditions while the latter class, or paranuclein, is not so easily digestible.

"Kühnes' anticomplex" is formed when the paranuclein digestion is carried on further and under favorable conditions, whereas the phosphorus-containing portion which was split off from it by the peptid cleavage is broken down still further to the phosphorus-rich acid combinations (paranucleic acid). This explains the observed increase of the acid digestion products during the digestion of casein.

A contribution to nitrogen determination, E. A. MITSCHERLICH (*Chem. Ztg., 33 (1909), No. 119, p. 1058*).—This is a polemical article in reply to Schencke (E. S. R., 21, p. 611), and compares the results obtained with the Mitscherlich, Schencke, and Densch methods. For nitrates the Mitscherlich method yielded the highest results of the three methods. The same was the case in determining nitrites, and for these Schencke's method gave results 51.2 per cent lower than that of the author.

Determination of nitrogen in nitrites and nitrates, V. SCHENCKE (*Chem. Ztg., 33 (1909), No. 136, p. 1203*).—A reply to Mitscherlich's criticism, noted above. The author states that his method was only recommended for nitrate determinations, and further, that in order to secure accurate results with the reduction of nitrates according to Ulsch's method a certain concentration of the solution must be present.

On the determination of potassium by the cobalti-nitrite method, L. T. BOWSER (*Jour. Indus. and Engin. Chem., 1 (1909), No. 12, pp. 791–798, fig. 1*).—Owing to the advantages of the cobalti-nitrate method over the platinum method, the author investigated Adie and Wood's alkali method and the acid method, but found that neither of these methods as now employed furnishes results sufficiently correct for quantitative purposes. The author's method, which is a modification of that of Adie and Wood, is more accurate.

The method is carried on as follows: A 0.75 per cent potassium oxid solution is made, the potash being brought into solution by the usual methods, and any excess of acid removed by evaporation. The residue after evaporation is taken up with water, and any metal present which may interfere is removed by boiling with sodium carbonate. The solution is then filtered and the precipitate obtained is washed with hot water. The washings and the filtrate are combined, acidified with acetic acid and the potassium precipitated as follows: Five cc. of the 0.75 per cent solution (equivalent to 0.0375 gm. potassium oxid), 10 cc. of the cobalti-nitrite reagent, and 1 cc. of strong acetic acid are placed in a porcelain evaporating dish. The mixture is then evaporated to a paste on the steam bath and after cooling the residue is stirred up with 25 to 50 cc. of water and filtered through asbestos and the precipitate washed with sufficient water to remove the excess of reagent. The precipitate and asbestos are then transferred quantitatively to a 250 cc. beaker. To the beaker there is then added an excess of decinormal potassium permanganate solution, and the mixture brought to the boiling point. When the solution begins to darken 5 cc. of a 1:1 sulphuric acid solution is added, and then titrated back with decinormal oxalic acid solution and potassium permanganate solution to the end point. Each cubic centimeter of potassium permanganate used is equivalent to 0.0008573 potassium oxid.

The cobalti-nitrite reagent is prepared by dissolving 220 gm. of sodium nitrite in 400 cc. of water, and 113 gm. of cobalt acetate in 300 cc. of water and 100 cc. glacial acetic acid. The solutions are then poured together, gently warmed, and the nitrogen peroxid which is evolved removed from the bottle by means of a filter pump which is allowed to run overnight. After this the solution is filtered and made up to 1 liter.

Determination of phosphoric acid in acid solution with alkaline molybdate solution and glue, A. GRETE (*Ber. Deut. Chem. Gesell., 42 (1909), No. 13, pp. 3106–3115; abs. in Chem. News, 100 (1909), No. 2605, p. 220*).—To the solution containing phosphoric acid are added a glue solution, ammonium nitrate, and nitric acid. After boiling, molybdic acid is added drop by drop from a burette until a definite precipitate remains. The solution is then again boiled and well shaken until a compact yellow precipitate is obtained, when more molybdic

acid is added in the same manner until no more precipitate is formed. From the amount of molybdic acid used the phosphoric acid content can be calculated.

The reagents employed are a molybdic acid solution, which is prepared by adding a concentrated solution of molybdic acid in ammonium hydrate to nitric acid until the precipitate obtained does not redissolve, and adding ammonia. The solution is then titrated with potassium diphosphate solution and each cubic centimeter made to correspond to 0.0025 gm. phosphoric acid. The nitric acid-ammonium nitrate solution is composed of 200 gm. ammonium nitrate and 26.5 cc. nitric acid and made up to 1 liter. The glue solution is made by soaking the glue overnight in cold water, pouring off the water, and boiling the residue in water and nitric acid. After cooling, the mixture is made alkaline with ammonium hydrate, and magnesia mixture added in order to precipitate any phosphoric acid which may be present in the glue. Ammonium carbonate is then added and the glue solution filtered off when required.

Estimation of sulphur in alkali polysulphids, C. Dusserre and V. Vuilleumier (*Chem. Ztg., 33 (1909). No. 127, p. 1129; Analyst, 34 (1909), No. 405, p. 545*).—As other forms of sulphur exist in these insecticides besides the active polysulphid, the authors suggest estimating the latter as follows: Dissolve 10 gm. of the substance in 500 cc. of water and filter. Place 5 cc. of the filtrate in a flask with 30 to 40 cc. of strong ammonia, and dilute with an equal volume of water. Heat the mixture gradually to the boiling point and titrate with decinormal silver nitrate solution, adding the same drop by drop until a black precipitate suddenly forms and leaves a colorless supernatant liquid. Each cubic centimeter of silver nitrate used equals 0.0016 gm. of sulphur in the polysulphid form.

Volumetric estimation of calcium oxid in presence of dissolved silica, K. Balthasar (*Chem. Ztg., 33 (1909), No. 71, pp. 646, 647; abs. in Jour. Chem. Soc. London, 96 (1909), No. 564, II, p. 831*).—The method is carried out as follows: Seven-tenths gm. of the substance (cement, etc.) is treated with strong hydrochloric acid, using heat if necessary. The mixture is then transferred to a 350 cc. flask, rinsed with water until about 100 cc. is obtained and boiled a few minutes to expel carbon dioxid. After this 50 cc. of ammonium mixture (25 gm. ammonium chlorid, 100 cc. acetic acid and ammonium hydroxid to make 1000 cc.) is added, boiled, and then while boiling 50 cc. of seminormal oxalic acid is added, cooled, and filled to the 350 cc. mark with water. The solution is then filtered and in 50 cc. of the filtrate the excess of oxalic acid is determined by decinormal permanganate in the presence of 5 cc. of sulphuric acid and a few cubic centimeters of manganous sulphate solution. From this data the percentage of calcium oxid is calculated.

Estimation of calcium carbonate in soils, F. S. Marr (*Jour. Agr. Sci., 3 (1909), No. 2, pp. 155–160*).—The author draws attention to the fact that the boiling strong acid employed in the analysis of soils decomposes some of the organic matter and results in the production of carbon dioxid. Soils which contain less than 1 per cent of calcium carbonate, particularly acid soils, therefore yield incorrect results on analysis. Recommendations are made to eliminate this source of error, such as the reduction of the strength of the acid, etc.

A modification of the Kjeldahl method for foods, R. Corradi (*Bol. Chim. Farm., 46 (1907), pp. 861–864; abs. in Ztschr. Untersuch. Nahr. u. Genussmtl., 18 (1909), No. 11, p. 671*).—The modification consists of the use of sodium hypobromite and thereby discarding the usual distillation process.

The method is as follows: To 2.5 gm. of a foodstuff which contains more than 3 per cent of nitrogen, or 5 gm. of a foodstuff which contains less than 3 per

cent of nitrogen is added (after previous drying), 30 cc. of fuming sulphuric acid. The mixture is then poured into about 40 cc. of water, nearly neutralized with sodium hydroxid, and made up to 250 cc. Twenty-five cc. is then mixed (with proper precautions) with 25 cc. of hypobromite solution and the decomposition allowed to take place in the Dupre apparatus as modified by the author. To the amount of nitrogen thus found 1.7 per cent must be added, as not all of the nitrogen present in the sample is liberated.

Detection of flour adulteration by the serum diagnostic method, W. MAGNUS (*Landw. Jahrb., 38 (1909), Ergänzungsb. 5, pp. 207–215*).—This is a description of the precipitin reaction as applied to the detection of vegetable proteids, particularly in flour adulterations, and of the method of producing the specific serum.

The bleaching of flour, J. BUCHWALD and M. P. NEUMANN (*Landw. Jahrb., 38 (1909), Ergänzungsb. 5, pp. 197–206, fig. 1*).—The authors show that with Alsop's nitrogen dioxid apparatus the white color of fine flours may be rendered 2 or 3 shades lighter, but that with coarsely ground dark flour no bleaching can be done. They attribute this to the fact that the latter have a higher percentage of fat and contain larger sized and more seed hulls. The hulls contain a dark tannic acid which can not be destroyed by the bleaching process. The bleaching process was not found to increase the baking value of the flour, but on the other hand it did not diminish it.

The bleaching of flour, H. ROUSSET (*Rev. Gén. Chim., 12 (1909), No. 19, pp. 308–316, figs. 7; abs. in Ztschr. Angew. Chem., 22 (1909), No. 50, p. 2429*).—The author discusses the different bleaching agents and their detection in the flour, and reports results on attempts to bleach by-products of the milling industry, such as bran. It is shown that the various bleaching agents have no decolorizing power on bran. Tests with liquid bleaching substances also gave negative results. The author shows by tests that it is possible to wash out 90 per cent of the starch content of the bran and recommends the use of this product for sizing linen. The residue can be used, when mixed with molasses, for cattle feed.

Judging honey by the biological method, J. LANGER (*Arch. Hyg., 71 (1909), No. 3, pp. 308–330*).—The author made a further study of the application of the precipitin reaction for detecting honey adulteration. The proteid of honey was found to be identical with that of pollen. By precipitating with ammonium sulphate 10 gm. of pollen were found to contain 5.6 per cent of nitrogen, or about 15 times as much as is found in natural honey.

The method recommended by the author is as follows: Ten gm. of the honey in question is dissolved in 10 cc. of water, filtered, and 5 cc. of this mixture placed in each of 2 dializing thimbles (Schleicher and Schull) and dialized for 24 hours into distilled water. The water should be changed 2 or 3 times during this interval. The dializates are then combined and made up to 30 cc., washings and all, and filtered. From this mixture, 1 cc. of 10 and 20 per cent solutions by volume are made up and placed in 2 graduated centrifuge tubes. A third tube is filled with the original solution. To each of the 3 tubes there is added 1 cc. of specific serum and 1 drop of toluol, and they are then placed in the incubator for 24 hours. After this the tubes are centrifuged for 5 minutes and the height of the precipitate noted. Certain pure honeys did not give the reaction.

Detection of fuchsin in wines and sirups, A. CAROBBIO (*Bol. Chim. Farm., 46 (1907), pp. 535–537; abs. in Ztschr. Untersuch. Nahr. u. Genussmtl., 18 (1909), No. 11, p. 712*).—The author describes 2 methods:

(a) To 1 cc. of the sample is added 1 to 2 cc. of paraldehyde and then 4 to 5 drops of a 50 per cent potassium iodid solution in distilled water. After shak-

ing and preventing as much as possible the formation of an emulsion, the mixture is allowed to stand for a time. If fuchsin is present, the paraldehyde layer will be red in color. The reaction is sensitive to 1 part in a million.

(b) One cc. of the sample is diluted with 2 cc. of water. Then 2 cc. of a saturated solution of salicylic acid in chloroform is added, shaken, and allowed to stand. The presence of fuchsin is indicated by the red coloration of the chloroform layer.

Olive oil, E. R. Miller (*Proc. Ann. Conv. Ala. Pharm. Assoc., 27 (1908), pp. 71–73*).—The results of analyses of 30 samples of olive oil collected in 3 different States showed a positive Halphen reaction in 11 instances. The nitric acid test and silver nitrate test, on the other hand, showed a slight reaction in some instances where none was apparent with Halphen's reagent.

Pecan oil, A. C. Deiler and G. S. Fraps (*Amer. Chem. Jour., 43 (1909), No. 1, pp. 90–91*).—An anaylsis at the Texas Experiment Station of pecan oil obtained from pecan nuts which consisted of 47 per cent kernels and contained 70.4 per cent of oil, gave the following results: Specific gravity 15° C. 0.9184, saponification value 198.0, iodin absorption (Hübl's method) 106.0, volatile acids (Reichert-Meissl value) 2.2, acetyl value 1.16, insoluble fatty acids (Hehner value) 93.4 per cent, lecithin 0.5 per cent, and cholesterol 0.28 per cent.

A method for the determination of citral in lemon extracts and lemon oils, R. S. Hiltner (*Jour. Indus. and Engin. Chem., 1 (1909), No. 12, pp. 798–800*).—The method is a colorimetric one, using Schreiner's apparatus and a 1 per cent solution of metaphenylenediamin hydrochlorid in 50 per cent ethyl alcohol as the reagent. All operations may be carried on at room temperature.

The determination of essential oil and moisture in spices and aromatic drugs, R. A. Cripps and J. A. Brown (*Analyst, 34 (1909), No. 405, pp. 519–523*).—The authors did not obtain good results by determining the oil and moisture directly and therefore suggest employing an indirect method, that is, determining (a) moisture and (b) total volatile matter, the difference being the essential oil.

The moisture is determined by heating the spice in a stout tube according to Dupre's method for cordite, allowing the vapor therefrom to act upon calcium carbid and measuring the amount of acetylene formed in a nitrometer. The number of cubic centimeters of gas obtained multiplied by 0.001725 giving the weight of water in the sample. For the total volatile matter (essential oil plus moisture), the authors heat a tube containing the spice at a temperature of 135° C., passing a current of air through it simultaneously for a period of 1 hour or less, and noting the loss of weight.

Detection of coffee adulterations, M. Cantagrel (*Ann. Falsif., 2 (1909), No. 12, pp. 460–463; abs. in Chem. Ztg., 33 (1909), No. 136, Repert., p. 582*).—The method is based on the fact that coffee contains about 25 per cent of total extractive matter, so that for every 5 gm. of coffee substitute present there is a diminution of this extract by 1.2 per cent. It is further shown that coffee has a maximum reducing value, so that any values beyond this indicate adulteration with some roasted substance containing sugar.

On the phosphates in certain vinegars and in the materials used in their manufacture, T. Fairley (*Analyst, 34 (1909), No. 405, pp. 515, 516*).—The author investigated certain vinegars which, though normal in other respects, did not have the requisite amount of phosphates present. It was found that the mash of these vinegars was made partly from corn and was filtered previous to fermentation, so that a considerable amount of the phosphates was retained in the draff or grains.

Iron as an agent causing discoloration of food products, E. W. Duckwall (*Canner and Dried Fruit Packer, 29 (1909), No. 23, pp. 27–30*).—Largely on

the basis of experience, the author discusses the discoloration which may occur in the manufacture of pickles and other food products owing to the presence of iron. In processing canned goods of different sorts hydrogen sulphid causes discoloration by acting upon the iron present, for instance, in the water used in preparing the can contents.

Indirect determination of the total solids in milk, D. GIRIBALDO and A. PELUFFO (*Monit. Sci., 4. ser., 23 (1909), II, No. 812, pp. 489–499*).—This is a description of the origin and basis of the formulas employed to determine the total solids of milk indirectly.

Determination of fat in dairy and other products by Gottlieb's method, L. GRÜNHUT (*Ztschr. Analyt. Chem., 48 (1909), No. 12, pp. 781–785, figs. 2*).—A description of the various forms of apparatus and modifications of Gottlieb's method for the determination of fat.

An anaeroxydase and a catalase in milk, SARTHOU (*Chem. Ztg., 33 (1909), No. 141, p. 1240, fig. 1*).—It is stated that milk contains an anaeroxydase which is soluble in water and milk serum and also a catalase which is insoluble. Further, that insoluble casein oxidizes *p*-phenylendiamin but not guaicol, and that the former is an extraordinarily sensitive reagent which must be taken into consideration when testing for oxidizing ferments.

About an anaeroxydase and a catalase in milk, F. BORDAS and TOUPLAIN (*Compt. Rend. Acad. Sci. [Paris], 149 (1909), No. 22, pp. 1011, 1012*).—The authors state that the presence of a catalase and anaeroxydase as noted by Sarthou above is not proved, and that the color reaction produced in raw milk is brought about by the decomposition of hydrogen peroxid and is due to the calcium caseinate.

Detection of cows' milk in asses' milk, L. GRIMBERT (*Jour. Pharm. et Chim., 6. ser., 30 (1909), No. 7, pp. 298–300; abs. in Chem. Ztg., 33 (1909), No. 141, Repert., p. 605*).—As asses' milk contains no anaeroxydase the presence of cows' milk, which contains anaeroxydase, can easily be detected with a 1 per cent guaiac solution and peroxid of hydrogen.

The catalase reaction of colostrum, J. VAN HAARST (*Meded. Rijks Hoogere Land, Tuin en Boschbouwsch., 1 (1908), pp. 27–32*).—On the basis of his investigations the author concludes that where the catalase content is higher than the normal, abnormal milk is to be suspected.

About the refraction and specific gravity of calcium chlorid milk serum, G. WIEGNER and G. YAKUWA (*Milchw. Zentbl., 5 (1909), Nos. 11, pp. 473–487; 12, pp. 521–530*).—The authors conclude from their work that the specific refraction of the calcium chlorid serum is independent of the temperature and, in very wide limits, of the concentration. It is shown that water added to the extent of only 50 per cent increases the specific refraction from 0.2056 to 0.2058. Calculated from the chemical composition of the serum (refractive index at 17.5° C., specific gravity at 15° compared with water at 15°), the specific refraction is 0.20552.

The specific refraction is also independent of the milk, sugar, protein, and citric acid of the serum, but is in a slight degree dependent upon the ash. If the ash content falls by 0.3 per cent the specific refraction increases from 0.2056 to 0.2058. The tests demonstrate its constancy with different fat, protein, and sugar contents of the milk. Watering the milk to the extent of 50 per cent in one experiment showed higher figures (within the limit of the calculated ones), but watering to the extent of 25 per cent showed nothing.

The work further indicates that the refractometric and the specific gravity methods are of equal value and importance. As to their relative accuracy, a variation of 1° of the immersion in the refractometric scale is equivalent to 0.001 of specific gravity.

The decomposition degree of cream, W. Morres (*Milchw. Zentbl., 5 (1909), No. 12, pp. 540–543, pl. 1*).—The author proposes to determine the degree of decomposition of cream by comparing the depth of color produced with alizarin solution with a color scale in which each shade represents a certain degree of acidity. The alcohol test (E. S. R., 22, p. 414) can be carried on at the same time and furnishes additional information.

Detection of oleomargarine in butter, M. Raffo and G. Foresti (*Gaz. Chim. Ital., 39 (1909), II, No. 5, pp. 441–444*).—The method consists in determining the viscosity of the fat at 50° C. with Ostwald's viscosimeter. The results are expressed in minutes and compared with water.

Operating the casein test at cheese factories, E. B. Hart and W. H. Cooper (*Wisconsin Sta. Circ. Inform. 10, pp. 4*).—This circular contains directions for using the Hart casein test (E. S. R., 19, p. 707) in cheese factories. The various factors which influence the results are mentioned, as well as a discussion of how often it is necessary to carry out the test in order to have perfect control of the industry, and a description of the method of payment for milk.

Holde's test and the detection of paraffin wax, etc., in lard and other fats, H. Dunlop (*Analyst, 34 (1909), No. 405, pp. 524, 525*).—The author considers Holde's test for detecting mineral oils in fatty oils much more delicate and economical than that proposed by Shrewsbury (E. S. R., 21, p. 613).

[Test for foreign fats in beeswax], P. Le Naour (*Ann. Chim. Analyt., 14 (1909), No. 10, pp. 369, 370; abs. in Jour. Soc. Chem. Indus., 28 (1909), No. 22, p. 1211*).—The author finds certain defects in the test recommended by the French Codex of 1908.

Estimation of nicotine in concentrated tobacco juices, F. Porchet and F. Régis (*Chem. Ztg., 33 (1909), No. 127, p. 1128; Analyst, 34 (1909), No. 405, pp. 534, 535*).—Toth's method is to be given the preference over Biel's or Schloesing's. The maximum difference between duplicate determinations with Toth's method was 0.8 per cent. The amount of nicotine in various tobacco extracts examined was from 4 to 10 per cent.

About tobacco fermentation, F. W. J. Boekhout and J. J. Ott de Vries (*Centbl. Bakt. [etc.], 2. Abt., 24 (1909), No. 18–22, pp. 496–511; abs. in Chem. Zentbl., 1909, II, No. 18, p. 1583*).—The authors show that at a temperature of 100° C. oxidation of the tobacco leaf takes place with an evolution of carbon dioxid. In the presence of water this oxidizing action is much more marked, as shown by the amount of carbon dioxid evolved in 8 to 16 hours with and without water. It is also indicated that at 33° the oxidation process is already present and that the rate increased with the rise in temperature. Further changes are the diminution which takes place in the nitrogen-free extractive substances, among others the pentosans which yield furfurol.

It is stated that the tobacco fermentation is a chemical process which is caused by the oxygen in the air, the reserve iron in the plant acting as the catalytic agent. The iron content of Holland tobacco leaves is found to be from 0.06 to 0.09 per cent, while Deli contains from 0.03 to 0.34 per cent iron oxid.

New method for the rapid determination of alcohol, D. Sidersky (*Bul. Assoc. Chim. Sucr. et Distill., 27 (1909), No. 6, pp. 562, 563*).—It is often necessary to determine alcohol rapidly at various stages during the course of the fermentation process. The method which is recommended by the author is based on the principle of the miscibility of ether with alcohol of high concentration.

Concerning methods of urine analysis, A. Jolles (*Ber. Deut. Pharm. Gesell., 19 (1909), No. 8, pp. 477–490*).—A summary and discussion of data.

Estimation of amino acids in urine by titration in the presence of formaldehyde, H. MALFATTI (*Ztschr. Physiol. Chem., 61 (1909), No. 6, pp. 499-507; abs. in Analyst, 34 (1909), No. 405, pp. 529, 530*).—The urine is treated with mercuric chlorid and sodium carbonate to precipitate the ammonia. The amino acids are then titrated in the filtrate after removing excess of lead with $\frac{N}{14}$ sodium hydroxid in the presence of formaldehyde.

The estimation of fat in feces, P. ROCHAIX (*Jour. Pharm. et Chim., 6. ser., 30 (1909), No. 11, pp. 487-494*).—A summary and discussion of data and methods.

The standardization of acid butyrometric apparatus, W. SCHLÖSSER (*Molk. Ztg. [Berlin], 19 (1909), No. 50, pp. 589, 590*).—This apparatus can be standardized with either water or mercury.

The destruction of platinum crucibles through the ignition of magnesium ammonium phosphate, R. E. LYONS (*Proc. Ind. Acad. Sci. 1908, pp. 161-163*).—"The cause of these occasional accidents is to be found in the reduction of the phosphate through incorrect procedure in burning or igniting the paper in connection with the precipitate, or, indirectly and less frequently, by failure to observe the well-established conditions for properly precipitating and washing magnesium ammonium phosphate." A series of suggestions are appended to prevent the destruction of platinum.

Hints for preparing berry wines, K. KROEMER (*Geisenh. Mitt. Obst. u. Gartenbau, 24 (1909), No. 7, pp. 97-104*).—This is a discussion and description of the manufacture of wines from currants, bilberries, gooseberries, blackberries, and raspberries.

Manufacture of denatured alcohol, H. W. WILEY ET AL. (*U. S. Dept. Agr., Bur. Chem. Bul. 130, pp. 166, pls. 3, figs. 12*).—This is a report of the proceedings of the school established by the Bureau of Chemistry of this Department for teaching the principles involved in the manufacture of denatured alcohol from trade and farm wastes to young men connected with the various experiment stations and agricultural colleges. It consists of a description of the chemistry and sources of alcohol, the malting process, the fermentation and distillation process, the physical and chemical tests employed in the distillery, lectures by various experts on distillery operation and control, miscellaneous lectures pertaining to the manufacture of alcohol, and an appendix on legislation, statistics, and special alcohol denaturants.

Beet-sugar making and its chemical control, Y. NIKAIDO (*Easton, Pa. and London, 1909, pp. XII+354, figs. 65*).—According to the preface this book is intended as an aid to those who have no systematic training in beet-sugar making and its chemical control. It opens with a brief consideration of inorganic and organic chemistry and shows the relation of these to beet-sugar making.

Manufacture of lactic acid, H. GOUTHIÈRE (*Bul. Assoc. Chim. Sucr. et Distill., 27 (1909), No. 6, pp. 576, 577*).—A description of the manufacture of this substance on both a small and large scale.

METEOROLOGY—WATER.

The influence of forests on climate and on floods, W. L. MOORE (*Washington, D. C.: U. S. House Representatives, Com. on Agr., 1910, pp. 38, dgms. 2, charts 3*).—From the observations summarized in this paper the following conclusions are drawn:

"(1) Any marked climatic changes that may have taken place are of wide extent and not local, are appreciable only when measured in geologic periods,

and evidence is strong that the cutting away of the forests has had nothing to do with the creating or the augmenting of droughts in any part of the world.

"(2) Precipitation controls forestation, but forestation has little or no effect upon precipitation.

"(3) Any local modification of temperature and humidity caused by the presence or absence of forest covering, the buildings of villages and cities, etc., could not extend upward more than a few hundred feet, and in this stratum of air saturation rarely occurs, even during rainfall, whereas precipitation is the result of conditions that exist at such altitudes as not to be controlled or affected by the small thermal irregularities of the surface air.

"(4) During the period of accurate observations, the amount of precipitation has not increased or decreased to an extent worthy of consideration.

"(5) Floods are caused by excessive precipitation, and the source of the precipitation over the central and eastern portions of the United States is the vapor borne by the warm southerly winds from the Gulf of Mexico and the adjacent ocean into the interior of the country, but little from the Pacific Ocean crossing the Rocky Mountains.

"(6) Compared with the total area of a given watershed, that of the headwaters is usually small and, except locally in mountain streams, their run-off would not be sufficient to cause floods, even if deforestation allowed a greater and quicker run-off. Granting for the sake of argument that deforestation might be responsible for general floods over a watershed, it would be necessary, in order to prevent them, to reforest the lower levels with their vastly greater areas, an impossibility unless valuable agricultural lands are to be abandoned as food-producing areas.

"(7) The run-off of our rivers is not materially affected by any other factor than the precipitation.

"(8) The high waters are not higher, and the low waters are not lower than formerly. In fact, there appears to be a tendency in late years toward a slightly better low-water flow in summer.

"(9) Floods are not of greater frequency and longer duration than formerly."

Climatic variations: Their extent and causes, J. W. GREGORY (*Ann. Rpt. Smithsn. Inst., 1908, pp. 339–354*).—This article discusses the general uniformity of climates in the past, exaggerated estimates of climatic changes, the relation of glaciation to local climatic variations, and causes of climatic variations. The author thinks it "probable that variations in climate, which have been established on adequate evidence, can be accounted for by differences in atmospheric circulation, due to different distributions of land and water."

Variations in climate, F. A. FOREL (*Arch. Sci. Phys. et Nat.* [*Geneva*], *4. ser., 28 (1909), No. 9, pp. 299–302*).—On the basis of data reported by Brückner and Hellmann, the author concludes that it appears that if there is a variation of long periodicity in rainfall it is neither universal nor continental, but is regional.

On the dynamics of climatic variations, H. ARCTOWSKI (*Compt. Rend. Acad. Sci.* [*Paris*], *149 (1909), No. 26, pp. 1417, 1418; abs. in Rev. Sci.* [*Paris*], *48 (1910), I, No. 2, p. 60*).—This is a brief account of studies more fully reported elsewhere (E. S. R., 22, p. 313), which indicated the occurrence of immense waves of excess or deficiency of heat which are not influenced by topographic conditions such as the existence of high mountains.

Annual variations in the amount of water in the Norwegian North Sea in its relation to varying meteorological conditions, yield of crops, and the fishery industry in Norway, B. HELLAND-HANSEN and F. NANSEN (*Internat. Rev. Gesam. Hydrobiol. u. Hydrog., 2 (1909), No. 3, pp. 337–361, figs. 17; abs. in Naturw. Rundschau, 24 (1909), No. 52, pp. 661–663*).—A uniform and direct re-

lation between the surface temperature of the North Sea and the yield of crops and the character of the fishing season in Norway is pointed out and illustrated in diagrams.

[Meteorological observations in Denmark] (*Statis. Aarbog Danmark, 14 (1909), pp. 184–186*).—Tables are given which show the average temperature for 40 years, 1861 to 1900, and for each year from 1901 to 1908; the maximum and minimum temperature for 1900 to 1908; the pressure of the air, direction of the wind, and storms for 1873 to 1908; precipitation, 1861 to 1908; and dates of frost, 1874 to 1908.

Meteorological and magnetic observations, M. Ruikatchev et al. (*Ann. Observ. Phys. Cent. Nicolas, 1906 [pub. 1909], pt. 1, pp. 417*).—Detailed data are given for observations during 1906 at the Constantin Observatory at Pavlovsk, the Nicolas Central Physical Observatory at St. Petersburg, and the observatory of Ekaterinburg. The observations include data for atmospheric pressure, temperature of the air and soil, precipitation, snow and frosts, sunshine, and magnetic and electric conditions.

Report on the work of the station of agricultural climatology of Juvisy during 1908, C. Flammarion (*Bul. Mens. Off. Renseig. Agr. [Paris], 8 (1909), No. 8, pp. 1089–1123, figs. 10*).—As usual, this report contains records of observations on atmospheric pressure, the temperature of the air, soil (see also p. 521), and underground water, the relative humidity, rainfall, sunshine, cloudiness, radiation, and wind, influence of different colored lights and of the moon on growth of plants (p. 529), and the falling and renewing of leaves. The data are recorded in tables and diagrams.

Composition of Barbados rainfall (*Rpt. Agr. Work Barbados, Imp. Dept. Agr. West Indies, 1906–1908, p. 3*).—The amount, distribution, and composition of the rainfall at Dodds Botanic Garden during 1906 to 1908 are given in tabular form. The total rainfall from December, 1906, to May, 1908, was 59.02 in., containing approximately 201.5 lbs. of chlorin and 9.64 lbs. of nitrogen per acre.

Fertilizing value of rain water, T. Weedon (*Ann. Rpt. Dept. Agr. and Stock [Queensland], 1908–9, pp. 59, 60, 77, 78*).—Observations extending over 18 months, 1907–8, at three places in Queensland, one having a tropical rainfall, another a moderate rainfall, and a third a light rainfall, are reported. The annual rainfall at these places varied from 26 to 75 in., but the amount of nitrogen supplied to the soil by the rain water was practically the same (3 to 4 lbs. per acre). In the tropical rainfall nitrate nitrogen exceeded ammoniacal nitrogen. Data are reported showing that the rain at the beginning of showers contains more combined nitrogen than toward the end and that during heavy showers the amount of nitrogen is less than during light showers.

Agricultural and industrial hydrology of Argentina, E. H. Ducloux (In *Censo Agropecuario Nacional la Ganaderia y la Agricultura en 1908. Buenos Aires: Govt., 1909, vol. 3, pp. 103–149*).—This report deals with the character of the surface, subterranean, and mineral waters of Argentina, as well as with their classification and use for potable and medicinal purposes and for irrigation. Analyses of a large number of samples from different parts of the country are reported.

Waters, T. Weedon (*Ann. Rpt. Dept. Agr. and Stock [Queensland], 1908–9, pp. 60, 78*).—Analyses of a large number of samples (including artesian waters) examined not only for industrial purposes but also as to suitability for stock and irrigation are reported.

The farmer as an aquiculturist, J. Heyking (*Deut. Landw. Presse, 37 (1910), No. 4, pp. 33–35*).—This article discusses the possibilities of increasing the pro-

duction of small ponds by fertilizing and other means as a supplementary industry to farming.

Sewage disposal in the United States, A. WINSLOW (*Wasser u. Abwasser, 2 (1909), No. 4, pp. 149–158; abs. in Chem. Ztg., 34 (1910), No. 25, Repert., p. 102*).—This article discusses briefly the present status in the United States of intermittent filtration with and without septic treatment, contact and trickling beds, broad irrigation in the arid regions, chemical precipitation and disinfection of sewage, experimental investigations of sewage problems and the general outlook for sewage disposal.

With regard to sewage irrigation it is stated that the first sewage farm in the arid region was established at Cheyenne, Wyo., in 1883, and that there are at present a score or more such farms in operation, mainly in Colorado, Montana, Nebraska, and California. Probably the most successful of these farms is that at Pasadena, Cal., which was established in 1887. This farm, which contains 300 acres of land, successfully disposes of 800,000 gal. of sewage per day and produces valuable crops of English walnuts, barley, wheat, hay, pumpkins, and corn. The cost of operation is about $8,000 a year against a revenue from the sale of crops of nearly $12,000.

SOILS—FERTILIZERS.

The principles of soil management, T. L. LYON and E. O. FIPPIN (*New York and London, 1909, pp. XXXIII+531, pl. 1, figs. 157*).—This is the first volume of a Rural Text-book Series coordinate with the Rural Science Series issued under the same auspices. The latter series was "designed primarily for popular reading and for general use," the former is intended "for class-room work and for special use in consultation and reference. It is planned that the Rural Text-book Series shall cover the entire range of public school and college texts."

The book contains a large amount of well selected and up-to-date material, but its special value as a text-book would seem to consist largely in the systematic and logical treatment of the subject. It deals with the principles of soil technology and treats the subject strictly from the standpoint of plant production. In it "the authors have attempted to discuss the soil in all its relations to plant production, developing the interdependence of geological, chemical, bacteriological, physical, and industrial relationships in such a way as to give the student a grasp, albeit a brief one, of the entire subject in its many bearings. In its treatment, the book considers, first, the soil as a medium for root development; second, as a reservoir for water; third, as a source of nutrients; fourth, as a realm of organisms; fifth, in its relation to air; sixth, its relation to heat; and the relation of man to the soil follows as a consequence and conclusion."

The value of the book is increased by a detailed outline and table of contents and a carefully prepared index.

Soil surveys (*Agr. Jour. Cape Good Hope, 35 (1909), No. 6, pp. 674–679*).—This is a part of the presidential address of C. F. Juritz before section 2 of the South African Association for the Advancement of Science at Bloemfontein in September, 1909, in which the organization of a systematic survey under the auspices of the South African Union is advocated. The results of such work in the United States are cited as illustrating the need and value of such a survey. Preliminary work along this line in Cape Colony is also briefly referred to.

On the method of investigation of the microbiological properties of the soil, A. KRAINSKII (*Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 10 (1909),*

No. 3, pp. 289–302; abs. in Chem. Abs., 3 (1909), No. 24, pp. 2991, 2992).—The author rejects both the Remy and the Buhlert and Fickendey methods and proposes the following substitute, which, however, is based upon the Buhlert and Fickendey method: Place 100 gm. of the soil in a 1,000 cc. flask with 300 cc. of sterilized water and shake for 5 minutes, allowing the larger particles to settle. Then by means of a sterilized pipette connected with a long tube passing through the cork of the flask draw off the turbid liquid to be used in inoculating the culture media.

Tests of this method which gave very satisfactory results are reported. The author considers measurements of aerobic and anaerobic assimilation of nitrogen, nitrification, and denitrification necessary to the determination of the bacterial power of soils. Determinations of putrefactive power and ammonification are considered unnecessary.

As a culture solution for determining nitrification the author recommends 50 cc. of the Omelianski solution inoculated with 5 to 10 cc. of the soil solution prepared as described and kept at 30° C. for 10 days. For the study of denitrification the same conditions are recommended except that the period is reduced to 5 days.

Tillage in its relation to soil moisture, C. C. Thom (*Washington Sta. Popular Bul. 22, pp. 4*).—This is a brief popular discussion based upon the results of one year's study of methods of soil culture best adapted to the conservation of soil moisture in dry farming. These results especially emphasize the importance of plowing or thoroughly disking stubble after harvesting in order to store the winter rains and of disking or otherwise stirring the soil at as early a date in the spring as it will bear cultivation. Decided benefit was also obtained by subsurface packing of the soil immediately or very soon after plowing.

The scientific reasons for allowing land to lie fallow every other season in regions of deficient rainfall are explained. By this means more moisture will be conserved, if a proper soil mulch is maintained, and a store of available plant food will be accumulated which may be of great service to the succeeding crop. "This is especially true with regard to the supply of nitrates, for the practice of bare fallow is favorable to the growth of nitrifying organisms and consequent increase in available nitrogen."

The philosophy of conservation of soil moisture is summed up as follows: "Get as much as possible of the winter precipitation into the soil by a system of thorough fall cultivation. Retain it by an equally thorough system of early spring and succeeding summer cultivation."

On the absorptive power of some Russian soils, A. N. Sabanin (*Pochvovyedyenie [Pédologie], 1908, pp. 87–98; abs. in Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 10 (1909), No. 3, pp. 374, 375*).—In the experiments here reported the absorptive power for ammonia was determined by Knopp's method and that for phosphoric acid and lime by Wolf's method (slightly modified).

Wide variations were observed in the absorptive capacity of Russian soils of very diverse origin and composition, but there was no parallelism in these variations for ammonia, phosphoric acid, and lime. The greatest absorptive capacity for ammonia was found in soils rich in humus (chernozems), for phosphoric acid in ferruginous (red) soil, and for lime in alkali soils. The absorptive power for ammonia varied on the average with the content of hygroscopic water. Apparently, absorptive power is affected to some extent by mechanical composition, but to a less degree than by other factors. The absorption was affected not only by the character but also the quantity of the solution used.

Temperature of the soil, C. Flammarion (*Bul. Mens. Off. Renseig. Agr.* [*Paris*], *8* (*1909*), *No. 8*, *pp. 1106–1117*, *figs. 3*).—The results of several years' observations on the temperature of the soil at various depths down to 1 meter as compared with the temperature of the air are reported. The data are analyzed by Fourier's method and illustrated graphically.

It is shown that the diurnal variation of temperature decreases with the depth in the soil and with the season of the year. The temperature changes in the soil lag behind those of the air and this lag increases with the depth. For example, the maximum temperature of the air occurred on the average at about 2 o'clock p. m., of the surface soil at 1 o'clock, of the soil at a depth of 0.05 meter at 2.30, at 0.1 meter at 3.15, and at 0.25 meter at 6 o'clock p. m. The minimum temperature of the air and of the surface soil occurred a little before sunrise, at 0.05 meter a little after sunrise, at 0.1 meter 1 hour after sunrise, at 0.25 meter 4 hours after sunrise. In winter all layers of the soil were warmer than the air. The surface soil was warmer than the air during the period from May to November, the greatest difference in this respect occurring in July. The temperature of the surface soil declined toward the end of September to a point below that of the soil at a depth of 1 meter, in October below that at 0.5 meter, and in November below that at 0.25 meter.

The diagrams given show certain regular annual variations in the temperature of the soil during a series of years, following that of the air regardless of casual disturbing conditions. In December, January, and February there was a series of increasing temperatures with the depth in the soil; in May, June, and July a series of decreasing temperatures. The first inversion of temperature occurred in March to April, when the temperature of the soil was greatest at the surface and decreased to a depth of 1.5 meters, and the second in autumn, when the temperature of the surface layers was lowest and increased to a depth of 1.5 meters. The general character of the diurnal variation was the same in bare and sodded soil, but the upper layer of the sodded soil was warmer in winter and colder in summer than that of the lower layers.

Soil temperatures in upland moors and the soil air of different types of moors, P. Vageler (*Mitt. K. Bayr. Moorkulturanst.*, *1907*, *No. 1*, *pp. 1–51*, *pl. 1*, *figs. 3*).—This article describes the methods employed and reports the results of a large number of observations on moors of different kinds. The general conclusion reached was that temperature and air conditions as well as the decomposition processes in moor soils are interdependent and are modified by the moor vegetation. On the other hand, the vegetation is modified in composition by the physical and chemical conditions in the soil, so that there results a succession of plants, ending in the formation of the moor soils when the climatic conditions are favorable.

A classified bibliography of the literature of the subject is given.

The relation between vegetation, chemical composition, and fertilizer requirements of moors, E. Gully (*Mitt. K. Bayr. Moorkulturanst.*, *1909*, *No. 3*, *pp. 1–38*).—The results of detailed studies of the vegetation and chemical composition of South Bavarian moors of different types are reported, and an attempt is made to trace the relationship between the vegetation and chemical composition.

Contribution to the nitrogen assimilation of forests, G. Zemplén and G. Roth (*Erdészeti Kisérletek*, *10* (*1908*), *No. 1–2*, *pp. 1–61*).—Microscopic examinations of a number of different kinds of forest trees by the methods described by Jamieson showed the existence in all cases of the hair-like organs to which Jamieson has ascribed the power of fixing free nitrogen. The authors believe that this furnishes an explanation of the fact that the amount of nitrogen is

not only maintained but increases in forest soils although a large amount of nitrogen is used in forest growth.

The forest as a nitrogen collector, A. CIESLAR (*Centbl. Gesam. Forstw., 35 (1909), No. 2, pp. 89-92*).—This article reviews investigations by Henry, Zemplén and Roth, and others, showing the accumulation of nitrogen in forest soils.

Saline soils, A. B. LARRAINZAR (*Estac. Agr. Cent. [Mexico] Bol. 10, pp. 24*).—This is a summary of information on alkali soils.

Louisiana swamp land reclamation, E. WISNER (*Manfrs.' Rec., 56 (1910), No. 26, pp. 119-121, figs. 14*).—The progress of swamp reclamation in Louisiana as well as the use made of the reclaimed land is described.

Agrology of Argentina, P. LAVENIR (In *Censo Agropecuario Nacional la Ganadería y la Agricultura en 1908. Buenos Aires: Govt., 1909, vol. 3, pp. 153-231*).—This report deals at some length with the composition, classification, origin, and formation of the soils of Argentina. It is based upon examinations of a large number of samples from different parts of the country, the results of which are reported in detail.

Some granite soils of New South Wales, H. I. JENSEN (*Agr. Gaz. N. S. Wales, 20 (1909), No. 12, pp. 1085-1093*).—This is the first report on a series of systematic studies of the relation existing between various rock formations and the soils derived from them.

It gives the results of chemical analyses with notes on general physical characteristics of granite soils of the Bathurst, Bega, and Cowra districts of New South Wales, which are taken as typical of the soils of the basic granite areas. Analyses are also given of typical granites of Bathurst and Cowra, as well as results of a study of the progressive stages of rock decomposition in soils at different depths.

The analyses show greater uniformity in composition in the soils of inland areas than in those of the coastal area of Bega. The climate of the latter area is more favorable to rock decomposition, and for this reason the soils of this area are on the whole richer in potash than those of Bathurst and Cowra.

The analyses show that the subsoil in granite areas is invariably richer in mineral plant food, particularly potash, than the surface soil. The phosphoric acid decreases slightly and the nitrogen considerably with the depth, but the amounts of lime and potash are much larger in the subsoil.

A comparison of the granite soils with those of other types showed that they are not nearly so rich as many other soil types, as, for example, those derived from limestone and basalt and those of the river bottoms.

The granite soils are classified into two series, acid granites and basic granites. The characteristic vegetation and the manurial requirements of these two classes are discussed.

Maintaining fertility in Asia, F. H. KING (*Country Gent., 75 (1910), No. 2973, pp. 53, 54, figs. 4*).—This article describes from personal observation the methods followed in China, Korea, and Japan in the utilization of waste products for the maintenance of soil fertility. It is shown how soils which have been cropped for ages are maintained in a high state of fertility without the use of commercial potash salts, phosphates, or nitrates. The nitrogen is maintained by persistent and efficient culture of leguminous plants, and the available potash and phosphoric acid by the utilizatiton of wastes and treatment of the soil which unlocks and recombines in highly available form the essential fertilizing constituents. The careful methods which are used in the handling and composting of manures of all kinds are especially described.

Maintaining soil fertility in Japan, F. H. KING (*Orange Judd Farmer, 48 (1910), No. 4, pp. 131, 132, fig. 1*).—This article, which is based upon observations made during a recent visit by the author to Japan, shows how this

country, with twenty times as many people to the square mile and just as many animals as are found in the United States, is able to secure its food supply.

"Japan is now supporting a population in her four main islands of more than 48,500,000 people and more than 2,600,000 horses and cattle, nearly all of them laboring animals and all on only 21,321 square miles of cultivated land. This is at the rate of 2,277 people and 125 horses and cattle to each square mile of cultivated land."

It is shown that this result is brought about by the careful saving and use of every bit of fertilizing material, the use of green manure, and great care in the preparation and handling of the soil. Much of the fertilizing material is used in the form of composts. The methods of composting used in Japan are described as well as a type of house employed for the storage and protection of the compost and the composition of samples of the composts, green manures, and ashes used.

Dry farming in China, F. H. King (*Rural New Yorker, 69* (*1910*), *No. 4031, pp. 101, 102, figs. 2*).—The methods which have been developed after long years' experience in China are briefly described, particularly the method of utilizing manures of various kinds in composts which are practically niter beds.

The importance of suitable combinations of fertilizing constituents for plants, O. Lemmermann (*Illus. Landw. Ztg., 29* (*1909*), *No. 98, pp. 903, 904*).—Referring to a previous communication by Clausen (E. S. R., 22, p. 322) the author cites the work of various investigators as indicating that it is of great importance in plant production to secure an optimal relation between the various constituents of plant food, not only generally but for individual plants.

Work of the chemical laboratory, B. Welbel (*Ghodichnuii Otchet Ploty. Selsk. Khoz. Opuitn. Stantzii, 14* (*1908*), *pp. 94–143, 181–190, pls. 3, figs. 1*).—In continuation of previous work along similar lines (E. S. R., 20, p. 717) investigations were made during 1908 on the influence of manure and fertilizers, as well as green manure, upon the fertility of the soil.

Influence of fertilizers and manure.—In view of the fact that previous experiments had shown that the application of manure on fallow in a 4-year rotation sensibly and profitably increased the yield of the following crops, and that the manuring increased the proportion of nitrates in the soil as well as the amount of nitrogen assimilated by the crops, further experiments were undertaken to study the relation of the manuring to the assimilable phosphoric acid of the soil. In pot experiments it was found that the yields were better in a rotation with manure than in one without manure, but that the effect of the manure disappeared after 3 years. The manuring increased both the assimilable nitrogen and the assimilable phosphoric acid. In 3 years about 65 per cent of the nitrogen and nearly all of the phosphoric acid applied in the fertilizers were assimilated. The addition of manure ashes favored nitrification and furnished a good source of assimilable phosphoric acid. The use of sterilized manure reduced nitrification and such manure was but slightly superior to manure ashes as a source of assimilable phosphoric acid. The nitrogen of the manure was assimilated to a much less extent than the phosphoric acid.

The results indicate that manure exerts a beneficial effect through its mineral constituents and biological properties, but an unfavorable effect, particulary on nitrification, through its dead organic constituents. The results of the pot experiments were confirmed in the main by those of field experiments, and the general conclusion is drawn that the effect of manure in increasing yields is due to the presence of nitrogen and phosphoric acid which is readily assimi-

lated by plants. The assimilability of these constituents depends not only upon the individual characteristics of the plant grown but also upon conditions favoring the activity of the micro-organisms of the manure. These conditions are best realized in fallow and to the least extent in spring wheat soil.

The influence of green manures.—An examination of soils on which various leguminous and nonleguminous plants had grown showed much less nitrogen in the soil after the growth of cereals than after fallow or the culture of leguminous plants. On the other hand, the soil on which leguminous plants had been grown contained much less phosphoric acid than the grain soil. Among the leguminous plants the best results as regards phosphoric acid were obtained with esparcet and the poorest with clover, which left the soil with a smaller amount of phosphoric acid and nitrogen. Fallowing increased to a considerable extent the proportion of assimilable phosphoric acid and potash in the soil.

Short supplies of stable manure (*Mark Lane Express, 103* (*1910*), *No. 4084, p. 11*).—Attention is called to the decreasing supply of stable manure resulting from the increased use of motor traction in England. It is also pointed out that the large applications of manure which have heretofore been used are not necessary and "are not economically sound, as equally good results can be obtained by quite moderate dressings of dung, supplemented by the judicious use of artificial manures."

Mixing superphosphate with farmyard manure (*Mark Lane Express, 103* (*1910*), *No. 4084, p. 11*).—Attention is called in this article to experiments by Dumont (E. S. R., 21, p. 531) which showed that the efficiency of superphosphate is increased by mixing it with well rotted manure.

Fertilizer experiments with phosphates, II. KLEBAHN (*Jahresber. Ver. Angew. Bot., 6* (*1908*), *pp. 280–287; abs. in Centbl. Bakt.* [*etc.*], *2. Abt., 25* (*1909*), *No. 10–13, pp. 319, 320*).—In comparative tests of Thomas slag, agricultural phosphate, and superphosphate on sand and moor soils planted to barley and oats it was found that the Thomas slag and agricultural phosphate gave the best results on moor soils, but that Thomas slag produced very little effect and agricultural phosphate none on sandy soils. The favorable action of the agricultural phosphate on moor soils was also demonstrated in field experiments, and is attributed to the acid properties of such soils. Free phosphoric acid proved injurious on moor soils but produced the largest yield on sandy soils. Superphosphate with and without lime was much more effective on oats than on barley. In field experiments on grass lands Thomas slag gave the best results, followed in order by superphosphate and agricultural phosphate. In field experiments with oats the Thomas slag and agricultural phosphate were about equally effective, and slightly superior to superphosphate. See also a previous note (E. S. R., 21, p. 315).

The world's production of phosphatic fertilizers, P. LAVOLLÉE (*Bul. Soc. Agr. France, 1910, Jan. 1, pp. 44–47*).—Statistics are given of the production and distribution of natural phosphates in different countries from 1898 to 1908, as well as of the details of the consumption of phosphates and superphosphates in France during the same period.

The world's production, according to the figures given, increased from 2,405,500 tons in 1898 to 5,218,000 tons in 1908. During that period there was practically no increase in production in Belgium, a decided decrease in France, a considerable increase in Algeria, and a large increase in Tunis, the United States, and the Pacific Islands. The countries showing the largest consumers of phosphate in 1908 were the United States 1,365,000 tons, France 1,106,000 tons, Germany 770,500 tons, Italy 590,500 tons, Great Britain 529,500 tons.

Two little known fertilizers, L. Ledoux (*Jour. Soc. Agr. Barbant et Hainaut, 55 (1910), No. 1, pp. 8–10*).—The composition and fertilizing value of precipitated phosphate, ammoniated and unammoniated, are discussed. It is stated that precipitated phosphate contains from 28 to 34 per cent of phosphoric acid soluble in alkaline ammonium citrate and that ammoniated precipitated phosphate contains nearly the same amount of citrate soluble phosphoric acid and from 5.25 to 6 per cent of ammoniacal nitrogen.

Tests of the fertilizing value of these phosphates in comparison with other phosphatic fertilizers by various investigators are reviewed, the results indicating that the precipitated phosphate is practically as efficient as superphosphate.

Basic slag and potash for chalk land, J. Hughes (*Field [London], 114 (1909), No. 2974, p. 1146*).—Chemical examinations of 2 samples of soil from the Sussex chalk downs, one of which had been fertilized with phosphatic slag and potash and the other not so treated, are reported. The principal difference indicated by the analysis was the higher percentage of organic matter in the fertilized soil, and this is thought to explain the fact that this soil was greatly benefited by the application of a fertilizer like slag, containing a large amount of lime, when the soil already contained a high percentage of this constituent.

What is kainit? P. Krische (*Illus. Landw. Ztg., 29 (1909), No. 92, p. 855*).—It is stated that natural and commercial kainit are very different materials. The formula formerly given to the natural salt was K_2SO_4. $MgSO_4$. $MgCl_2$. $6H_2O$, containing 12.4 per cent of potash. As a result of Van't Hoff's investigations the formula KCl. $MgSO_4$. $6H_2O$ is now assigned to that salt.

Commercial kainit is stated to be either a mixture of natural kainit and rock salt, or muriate of potash, kieserite, and rock salt, or, occasionally, muriate of potash and rock salt, with a minimum potash content of 12.4 in the form of chlorid. It should not contain more than 6 per cent of chlorin soluble in 96 per cent alcohol.

The position of nitrate of soda (*Mark Lane Express, 103 (1910), No. 4085, p. 35*).—As a result of a review of the annual circulars and statistical reports of the leading dealers in nitrate of soda it is stated that "the salient features in the course of the industry are (1) the failure up to the present time of the negotiations to renew the combination between the producers which came to an end on March 31, 1909; (2) the consequent and continued fall in price of the commodity; (3) the increased consumption all over the world, especially in the United States of America."

The production of nitrate of soda in 1909 is given as 2,067,000 long tons, an increase of 6 per cent over that of 1908. The total consumption was 1,929,000 tons, of which the Continent of Europe used 1,354,000 tons, the United Kingdom 111,000 tons, the United States 398,000 tons, other countries 66,000 tons. The figures for consumption in the United States represent an increase of 89,000 tons over those for 1908. The prospect of increased prices for nitrate is discussed.

Experiments on the action of nitrite nitrogen in various new fertilizers, Gerlach (*Illus. Landw. Ztg., 29 (1909), No. 97, p. 895*).—The results of pot experiments with oats, mustard, and carrots, comparing the fertilizing value of nitrate of soda, nitrite of soda, and Norwegian nitrate containing a certain amount of calcium nitrite, indicated that the nitrite has a distinct fertilizing value and may be used in as large amounts as nitrate of soda without injurious effect.

Oxidation of atmospheric nitrogen, F. Haber and A. Koenig (*Ztschr. Elektrochem., 16 (1910), No. 1, pp. 11–25*).—This is a review of scientific investiga-

tions and patent literature on this subject from the middle of 1907 to the middle of 1909.

Reference list on the electric fixation of atmospheric nitrogen and the use of calcium cyanamid and calcium nitrate on soils, S. C. STUNTZ (*U. S. Dept. Agr., Bur. Soils Bul. 63, pp. 89*).—This list is introduced by a brief account of the development of methods of electric fixation of the nitrogen of the air. References are given to patent literature as well as to scientific and technical articles. It is explained that no attempt is made at absolute completeness. "What is attempted is to bring together, roughly classified, not only all the most important articles on all the branches of the subject, but also as many references as could possibly be verified, so that anyone having access to any collection of scientific or popular literature, no matter how small, will find some articles that are accessible to him." The titles are arranged chronologically under authors' names in 3 classes, (1) nitrogen, including general articles, (2) utilization of atmospheric nitrogen by electric fixation, and (3) calcium cyanamid and calcium nitrate.

The specific gravity of the more common commercial fertilizers, A. STUTZER (*Mitt. Deut. Landw. Gesell., 25 (1910), No. 1, pp. 9, 10*).—The specific gravity of the principal fertilizing materials is given for use in the better adjustment of fertilizer distributers.

Commercial fertilizers, J. S. BURD (*California Sta. Bul. 205, pp. 91–117*).—"The present report contains the tabulated analyses of fertilizers collected for the half year ending June 30, 1909. During this period 318 samples of fertilizers and fertilizing materials have been received at the laboratory. Of this number 39 were sent by farmers under the two-dollar fee provision, 189 were taken by inspectors from purchasers' goods upon the request of the purchasers, and 32 were taken by inspectors from goods in the hands of agents and manufacturers."

Analyses of commercial fertilizers, B. L. HARTWELL, J. F. MORGAN, and L. F. WHIPPLE (*Rhode Island Sta. Bul. 138, pp. 15–31*).—This bulletin completes the report on inspection of fertilizers during the season of 1909. Analyses and valuations of the fertilizers are given as well as comparisons of the actual with the guaranteed composition. "Based upon the nitrogen, total and available phosphoric acid, and potash in complete fertilizers, it was found that 74 per cent of the determinations were above the guaranties, 15 per cent were below, with a difference of 0.3 or more, and 11 per cent were below with a difference of less than 0.3."

Analyses of commercial fertilizers, M. B. HARDIN ET AL. (*South Carolina Sta. Bul. 147, pp. 44*).—This bulletin gives in tabular form the results of analyses of 805 samples of commercial fertilizers and discusses the sources of nitrogen, phosphoric acid, and potash in fertilizers, as well as the valuation of fertilizers.

The sale of fertilizers and farm foods, C. F. JURITZ (*Agr. Jour. Cape Good Hope, 35 (1909), No. 6, pp. 670–673*).—This article discusses the modified regulations regarding the sale of fertilizers and feeding stuffs which have recently been issued under the act of 1907, the purpose of the article being "to explain, in as simple language as possible, some of the technical requirements of the act, and of the regulations framed under its provisions."

AGRICULTURAL BOTANY.

Some conditions which influence the germination and fertility of pollen, E. P. SANDSTEN (*Wisconsin Sta. Research Bul. 4, pp. 149–172, figs. 5*).—As bearing on the problems of unproductive orchards, the author has given an account of investigations on the influence of environmental factors upon the production and fertility of pollen. After a summary of the morphology and physiology of

the pollen, descriptions are given of germination experiments in which the influence of a number of factors, such as temperature, moisture, etc., are given.

The germination and subsequent growth of the pollen tube are said to be very similar to the germination and growth of ordinary spores. Most pollen grains were found to germinate in solutions of cane sugar, although in the experiments reported the pollen of the tomato germinated best in a slightly acidulated sugar solution and the pollen of *Phaseolus multiflorus* in pure olive oil. A considerable range of concentration of solutions was noted for some species, while for others the range of concentration was quite restricted.

The growth of the pollen tube and the movement down the style was investigated, and the author believes that the length of the pollen tube of a given species is often a barrier against the cross pollination of related species and varieties.

In the experiments on temperature influence, pollen in a dry atmosphere was not seriously affected by temperatures of 25 to 55° C., but below 25° the germination was interfered with. A temperature of 70 to 80° in a saturated atmosphere was found fatal to the pollen of the peach, apple, and plum, and the author states that the pollen of these trees often burst in great masses during warm spring rains. Freezing temperatures, —1.5 to —1°, were not seriously injurious to the pollen of the apple, pear, or plum, but destroyed nearly half the peach and apricot pollen. The pistils of the varieties experimented upon were found more susceptible to the low temperature than was pollen.

Sunshine was found to have little or no effect on the germination of pollen or on the growth of the pollen tube in most plants. The germination and growth of pollen of the tomato were found to be decidedly retarded by cloudy weather, and the anthers of the tomato required a certain amount of sunshine for the proper development of their pollen. This was also true in several species of Lilium.

The lack of culture and fertility in orchards was found to reduce the production and fertility of pollen.

Experiments on the longevity of apple, pear, and plum pollen showed that in a dry place at temperatures ranging from 7 to 26° it could be kept for a considerable time, apple pollen retaining its vitality for 6 months or longer. With proper precautions it is possible that pollen may safely be shipped from one part of the country to another without losing its viability or fertility.

Under favorable conditions it is found to require from 9 to 32 hours for the pollen tube of apples, plums, and cherries to reach the ovary after having been placed on the stigma. This would indicate that the length of time required for the fertilization is less than is commonly believed, 2 or 3 bright warm days at the time of full bloom being sufficient for the setting of the fruit. The stigmas of apples were found to be receptive for from 4 to 6 days, whether pollinated or not. Continuous rainy weather for 6 or more days would probably result in a total failure of the crop in case of most fruits.

Summarizing the results, the author states that the factors which affect the fertility and production of pollen over which the orchardist has control are site, soil, planting, cultivation, pruning, spraying, and selection of suitable varieties. Those over which there is little or no control are freezing temperatures, continuous rainfall during the flowering period, high temperature with a large amount of moisture at the time of flowering, and the absence of insects and wind to transfer the pollen.

Handbook of flower pollination, P. KNUTH, trans. by J. R. A. DAVIS (*Oxford, 1909, vol. 3, pp. IV+644, figs. 208*).—This is the third and concluding volume of the work previously noted (E. S. R., 20, p. 326). It is based on H. Müller's work on the Fertilization of Flowers by Insects, and gives the results of

observations on 1,426 species of 544 genera of flowers and their insect visitors. The orders of plants reported upon are those from Goodenovieæ to Cycadeæ. The work concludes with a systematic list of the insect and other visitors arranged alphabetically.

Influence of food supply on variation, H. H. LOVE (*Amer. Breeders' Assoc.* [*Proc.*], *5* (*1909*), *pp. 357–364, dgms. 4*).—The author has carried on experiments with peas grown in sand, in ordinary garden soil, and in garden soil heavily fertilized with manure and acid phosphate, to test the effect of the available food supply on variation. A considerable number of peas were grown in the different plats, and the data are given in tabular and diagrammatic form.

It appears that of the three characters which have to do directly with the vigor of the plant, i. e., height, yield, and number of internodes, the variability as indicated by the standard deviation increases with the food supply. The coefficient of variability also increases with the food supply in the case of the yield and number of internodes, but in the case of height it is less on the fertilized plat than on the unfertilized.

A study of the tables indicates that the standard deviation increases more gradually as the food supply increases than the coefficient of variability, and that in studying and comparing such data the standard deviation is the best index where there are such wide differences between means as was the case in the author's experience.

Clonal or bud variation, H. J. WEBBER (*Amer. Breeders' Assoc.* [*Proc.*], *5* (*1909*), *pp. 347–357*).—The author calls attention to the possibilities of plant breeding through the selection of bud variations and points out a number of instances in both annual and perennial plants where this has been taken advantage of. He argues for a wider extension of this form of breeding and thinks that this field has been neglected and should certainly receive more consideration.

Variation and correlation in the flowers of Lagerstrœmia indica, J. A. HARRIS (*Mo. Bot. Gard. Ann. Rpt., 20* (*1909*), *pp. 97–104*).—A study has been made of the sepals, petals, and large and small stamens of the crape myrtle in order to determine the limits of variation and possible correlation, the data being presented as a contribution to a quantitative study of variation.

The correlation between length of flowering stalk and number of flowers per inflorescence in Nothoscordum and Allium, J. A. HARRIS (*Mo. Bot. Gard. Ann. Rpt., 20* (*1909*), *pp. 105–115, dgms. 2*).—As a result of statistical studies, the author found a considerable degree of correlation between the length of the flowering stalk of these monocotyledonous plants and the number of flowers which they produce.

Apogamy in the maize plant, G. N. COLLINS (*U. S. Nat. Mus., Contrib. Nat. Herbarium, 12, pt. 10, pp. 453–455, pls. 2*).—The author describes an abnormality found quite constantly occurring in a variety of Mexican corn grown at Victoria, Tex. The abnormality consisted in the production of branches or young plants in the place of the spikelets of the male inflorescence, and practically every plant of this variety exhibited this character to a greater or less degree. In the axils of the first leaves, which correspond to the outer glumes, small roots were found, and when separated from the parent plant these apogamous plants took root and made considerable growth, although none lived to maturity. This is believed to be a true case of apogamy similar to that in onions, certain species of Agave, and other plants.

The botany and origin of American upland cotton, F. FLETCHER (*Cairo Sci. Jour., 3* (*1909*), *No. 38, pp. 263–267, pls. 3*).—As a result of a study of a large number of plants, together with the literature relating to this species of

Gossypium, the author decides that the American upland cotton should be referred to *G. siamense* and not to *G. hirsutum* or *G. herbaceum*, as is commonly reported. The growth characters of the American upland cotton and the species described from Siam are quite similar, and the author thinks that it is probable that the upland cotton was introduced from eastern Asia to the botanic gardens and afterwards to cultivation in America.

Some cytological aspects of cotton breeding, L. BALLS (*Amer. Breeders' Assoc. [Proc.], 5 (1909), pp. 16–28, dgms. 2*).—The author discusses the connection between cytology and heredity, and gives an account of some of his investigations on the breeding of cotton.

A list is given of about two dozen allelomorphic pairs in cotton, which, although these do not by any means include all the possibilities of inheritance in cotton crosses, indicate the possibility of making over 600 pure strains. There is also a discussion of the development of the lint on the cotton seed. In conclusion the author states that he has found that the vast majority of crosses in a cotton crop are heterozygous in several characters, and that the amount of crossing which takes place between cotton plants growing in a field producing this heterozygous condition ranges from 5 to 25 per cent. As a result, no pedigree can be considered as evidence for or against any law of heredity unless this natural crossing has been recognized or excluded. Recognizing this tendency to heterozygosity, the author claims that the so-called easy variation of cotton is not a fluctuation, but is merely a difference of rigid gametic constitution, with some small amount of fluctuation. So far as has been investigated, Mendel's law applies to all characters of the cotton plant.

Seeds and plants imported during the period from January 1 to March 31, 1909. Inventory No. 18 (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 162, pp. 73*).—This gives a list, together with notes upon the economic value, of the seeds and plants secured between January 1 and March 31, 1909, the number of items amounting to 761. It is largely made up of collections forwarded by N. E. Hansen, of the South Dakota Station, while acting as an agricultural explorer for the Department.

Vitality of pine seeds and the delayed opening of cones, W. C. COKER (*Amer. Nat., 43 (1909), No. 515, pp. 677–681*).—Attention is called to the retention of the cones by the knob-cone and Monterey pines, the author stating that the cones are frequently retained unopened on trees that are 30 or more years old. As all cones are borne on new growth, the peduncles of the cones must be broken loose from their connection with the wood, so as to allow the cones to be pushed out by the annual growth. The cones that remain on the surface of the trunk are said to have no organic connection with the tree, and they do not shed their seeds until the tree or branch that bears them dies.

This condition of some of the California pines led the author to investigate the vitality of the seeds of the common *Pinus serotina* of South Carolina, which holds its cones unopened for several years. Specimens of unopened cones 10 or more years old were obtained, and the seeds collected and their germination determined. From the tabular statement presented the germination of the different lots was found to fluctuate, but seeds as old as 14 years gave considerable germination.

The effect of different solar radiations on plants, C. FLAMMARION (*Bul. Mens. Off. Renseig. Agr. [Paris], 8 (1909), No. 8, pp. 1117–1119*).—A brief account is given of investigations with beans, peas, and leeks, in which the effect of different colored screens on the nitrogen content of the plants is shown.

In general it was found that under the colored glass the increase in nitrogen is more rapid than under the clear glass. This increase seems to be greatest

under the colors which least stimulate the chlorophyll functions of the plants. With the exception of peas, the total nitrogen and albuminoid nitrogen were greatest under the green and blue colored screens.

The influence of shade upon the composition of plants, R. W. THATCHER (*Jour. Indus. and Engin. Chem., 1 (1909), No. 12, pp. 801, 802*).—In a previous publication the author has referred to the effect of shade on the constituents of the wheat kernel (E. S. R., 19, p. 435). In the present paper an account is given of investigations carried on by the author and some of the assistants at the Washington Experiment Station to determine the effect of shading on the composition of potatoes, field peas, emmer, wheat, oats, and barley.

Different densities of shade, lengths of time of shading, and crops have been employed, and it has been found that except with plants which become very dry in maturing, the moisture content is greatly increased under the shade. There is also a higher percentage of ash in the shaded samples, except in the case of oats, and a somewhat larger amount of crude protein in the plants grown under the shade.

The general effect of shading, whatever the texture of the material used or the length of the shading period, is to increase the percentage of moisture, mineral matter, and nitrogenous matter, with a decreased percentage of starch or carbohydrates. However, the increase in other constituents is not directly proportional to the decrease in starch. It is believed that the changes produced by the shade are not simply a deterrence of the elaboration of starch or other carbohydrates in the absence of direct sunlight, but that other physiological changes are induced by the shading.

Protein metabolism in plants and its relation to some physiological processes, F. EHRLICH (*Landw. Jahrb., 38 (1909), Ergänzungsb. 5, pp. 289–327*).—As a result of the author's studies on alcoholic fermentation, he arrives at the conclusion that through the breaking down of the sugars yeasts are supplied with the energy required for building up proteids. Part of the sugars form other carbohydrates, which, together with glycogen and amino acids, the yeast forms into characteristic proteids.

It is claimed that plants in general build their aromatic compounds chiefly from the proteids and that in a similar way, through the protein metabolism of the plants, fusel oil and other nitrogen-free substances are formed.

A comparative study on some vegetable diastases, C. GERBER (*Compt. Rend. Soc. Biol. [Paris], 67 (1909), No. 37, pp. 867–869*).—The results of a study of the proteolytic enzyms of *Pleurotus ostreatus* and of the paper mulberry are given. It is shown that the rennet of the fungus is greatly favored by lime and oxygen, is very sensible to alkalis, and slightly resistant to heat, while that of the paper mulberry is less influenced by lime and oxygen, is but slightly sensitive to alkali, and very resistant to high temperatures.

Starch formation from sorbite by the Rosaceæ, O. TREBOUX (*Ber. Deut. Bot. Gesell., 27 (1909), No. 8, pp. 507–511*).—Attention is called to the fact that sorbite can probably serve as a source of starch, as has been shown to be the case for mannite and dulcite of other plants. Sorbite, however, is found only in the fruit, while the others are found in all parts of the plants containing them.

As a result of a study of many species of rosaceous plants, the author concludes that the ability to form starch from sorbite is a distinctive characteristic of those species belonging to the tribes Pomeæ, Pruneæ, and Spiræeæ. In his investigations, no trace of starch which was made from sorbite was to be found in species of Roseæ and Rubeæ.

A critical examination of Sachs's method for using increase of dry weight as a measure of carbon dioxid assimilation in leaves, D. THODAY (*Proc. Roy.*

Soc. [London], Ser. B. 82 (1909), No. B 552, pp. 1–55, figs. 8).—This is a detailed account of studies which have been previously noted from another source (E. S. R., 21, p. 318).

The phosphorus metabolism in plants, W. STANISZKIS (*Bul. Internat. Acad. Sci. Cracovie, Cl. Sci. Math. et Nat., 1909, No. 6, pp. 95–123, pl. 1; abs. in Jour. Chem. Soc. [London], 96 (1909), No. 565, II, pp. 923, 924*).—A study was made of millet throughout its entire growing period to determine its phosphorus metabolism.

The seeds were found to contain but little inorganic phosphorus and during their development the phosphorus content increased with the increase in dry weight. Up to the time of the formation of the panicles only small quantities of organic phosphorus were formed, but afterwards up to the time of the ripening the amount of phosphoproteins, and especially phytin, increased considerably. At the same time phosphorus was found to pass from the stem to the leaves. The maximum lecithin content was found to occur in the early stages of the formation of the panicles. While these were being formed protein nitrogen decreased, although the total nitrogen increased. In the ripe millet seeds 97 per cent of the nitrogen was found to occur as protein. During the ripening of the seeds the ratio of the protein phosphorus to protein nitrogen was found to increase, showing that phosphorus-free proteins were being converted into phosphoproteins.

On the lack of antagonism between certain salts, C. B. LIPMAN (*Bot. Gaz., 49 (1910), No. 1, pp. 41–50, figs. 2*).—In continuation of earlier work (E. S. R., 21, p. 627) with respect to ammonification by *Bacillus subtilis*, an account is given of further experiments as to the effect of calcium, magnesium, and sodium salts on this organism.

The results of these experiments are in marked contrast to those generally obtained with green plants. The author found that for *B. subtilis* there was no antagonism between magnesium and calcium or between sodium and calcium. Any combination of magnesium and calcium proved more toxic than magnesium chlorid, and any combination of sodium and calcium salts was more poisonous than sodium chlorid alone. In these respects the behavior of *B. subtilis* is said to have no parallel among plants so far as studied, and scarcely any among animals.

Cultural studies of species of Penicillium, C. THOM (*U. S. Dept. Agr., Bur. Anim. Indus. Bul. 118, pp. 109, figs. 36*).—The author in previous work on fungi in cheese ripening (E. S. R., 17, p. 1186) encountered certain difficulties in identifying the Penicillium molds, which necessitated further culture and comparison of many other species and an examination of the nomenclature of the whole genus Penicillium.

It was found that the cultural description of species of molds demanded the recognition of the following points: (1) The culture media and conditions must be described so fully as to make the repetition of the culture upon the same medium and under approximately the same conditions easily possible anywhere; (2) the habit, structure, and appearance of the colony must be given as it develops on at least two standard media of decidedly different composition; (3) the physiological effects of the colony upon these media should be noted; (4) full drawings or photographs should show habit as well as microscopic details of cells and cell relations; and (5) other morphological or physiological data obtainable should be given as accessory information.

The author has followed this plan throughout the entire study of the 41 species of Penicillium noted, several of which are described as new. The paper closes with keys to the cultural identification of species and with tabular state-

ments of the salient characters and comparative cultural data of the various species of Penicillium.

A bibliography is appended.

Suggestion for a new bacteriological nomenclature, O. JENSEN (*Centbl. Bakt. [etc.], 2. Abt., 22 (1908), No. 4–6, pp. 97, 98; 22 (1909), No. 11–13, pp. 305–346, dgm. 1; abs. in Chem. Zentbl., 1909, II, No. 18, pp. 1579, 1580*).—The author recommends classifying bacteria into 2 groups according to their physiological and chemical actions, that is, cephalotrichinæ and peritrichinæ. The grouping excludes the actinomyces, the sulphur, and the thread bacteria.

FIELD CROPS.

Results obtained in 1909 on the Dominion Experimental Farms from trial plats of grain, fodder corn, field roots, and potatoes, W. SAUNDERS (*Canada Cent. Expt. Farm Bul. 64, pp. 53*).—Tables present the results of a continuation of variety tests previously noted (E. S. R., 21, p. 321), the yields in 1909 and the average yields for the past 5 years being given.

Report on oat and barley experiments, 1908, R. B. GREIG (*Aberdeen and No. of Scot. Col. Agr. Leaflet 8, pp. 11*).—Of the 6 varieties of oats tested each averaged per acre more than 50 bu. of 42 lbs. each at the 5 centers at which the tests were conducted. The Highlander and Thousand Dollar varieties proved the earliest. The milling properties of 7 varieties are given, loss of weight from drying, and weight of husks, dust, oatmeal, and meal per quarter being indicated.

In a test of 8 varieties of barley Danish Archer proved remarkably prolific. All were seeded at the rate of 2,500,000 seeds or from 4 to 4¾ bu. per acre. This rate of seeding yielded a total weight of from 4,548 to 5,370 lbs. per acre.

Annual report of the Burdwan Agricultural Station for the year 1907–8, F. SMITH (*Ann. Rpt. Burdwan Expt. Sta. [India], 1907–8, pp. 25*).—In a 4-year manurial test to determine the best forms in which to apply nitrogen to jute, 30 lbs. per acre applied in cow dung produced better results than the same amount in castor cake, bone meal, or bone meal and saltpeter. The greatest output of fiber was secured by cutting the crops when the fruits were dead ripe, but it had the highest valuation when cut as the fruits began to set. A higher yield was secured from plants spaced 4 in. apart than at any greater distance. The quantity and quality of fiber secured by drilling and by broadcasting were practically the same.

Tests of jute and paddy in rotation indicate that these crops may be used to produce a food and a money crop on the same land during the same year. The best results with potatoes came from an application of 22½ maunds (about 1,850 lbs.) of castor cake, but almost equally as good results were obtained from an application of 11¼ maunds of castor cake together with 7½ maunds of saltpeter, and very good results with conserved cow dung which cost less than one-third as much as castor cake.

Annual report of the Cuttack Agricultural Station for the year 1907–8, F. SMITH (*Ann. Rpt. Cuttack Expt. Sta. [India], 1907–8, pp. 30+III*).—Lime produced beneficial results in manurial experiments, especially in connection with dhaincha used as green manure. The addition of artificial to natural manures produced a slight increase in output, but at an economic loss. One maund (about 82 lbs.) of sulphate of magnesia produced a greater yield of paddy in proportion to the amount applied than did 2 or 3 maunds.

From 30 to 35 seers (62 to 72 lbs.) of paddy of medium sized grain proved the maximum amount per acre profitable in broadcast cultivation. The application of 2, 4, and 6 in. of water at intervals of 15 days beginning September 1, produced approximately equal yields of paddy.

Lime applied to plats of jute invariably produced an increase in yield but a decrease in the value per maund of the fiber. The greatest increase in value appeared to result from applications of (1) superphosphate and (2) superphosphate and saltpeter, while the highest yields resulted from very complete mixtures of artificial and natural fertilizers including lime.

Other crops reported are sugar cane, ground nuts, and papayas.

Annual report of the Dumraon Agricultural Station for the year 1907–8, F. SMITH (*Ann. Rpt. Dumraon Expt. Sta.* [*India*], *1907–8, pp. 20, dgm. 1*).—In a manurial experiment on sugar cane an application of 350 lbs. of nitrogen per acre in castor cake or cow dung gave a higher yield of raw sugar than did an application of 150 lbs. of nitrogen, but the increase was not in proportion to the amount of manure applied. Owing to the scarcity of the cow manure, it is recommended that one-third be replaced by castor cake, rape cake, safflower cake, or gingelly cake. Applications of saltpeter with the different cakes and bone meal are deemed impracticable unless very cheaply obtained, and applications of 250 lbs. of nitrogen proved uneconomical in all the different forms used. The Poona bed and the trench and furrow systems of planting surpassed the Raiyat and Mauritius systems.

On Aman paddy 40 lbs. of nitrogen per acre supplied by most manures is too large an amount to be economical. The highest profits secured were from the use of (1) cow dung and castor cake and (2) sun hemp as a green manure. Losses resulted from the use of (1) castor cake and (2) bone meal and saltpeter. The yield in the case of the latter was even lower than when no manure whatever was used.

Variety tests are reported in connection with cane, paddy, and oats.

Annual report of the Sibpur Experimental Farm and agricultural classes for 1907–8, S. K. BASU (*Ann. Rpt. Sibpur Expt. Farm* [*India*], *1907–8, pp. 10*).—In a manurial experiment with rice the highest profits were obtained from the use of dhaincha as a green manure and cow dung applied at the rate of 150 maunds (12,300 lbs.) per acre, while losses resulted from the use of apatite and saltpeter, bone meal and saltpeter, mahua cake, and rape cake. With potatoes the highest yield resulted from an application of 300 maunds of cow dung and the lowest from an application of 20 maunds of rape cake. On sugar cane, castor cake, bone meal and saltpeter, and apatite and saltpeter, each produced a marked increase in yield.

Seeding of jute seed at the rate of 6 lbs. per acre gave a higher yield of fiber than did the use of 7½ lbs. Potatoes planted at intervals of 9 in. in rows 18 in. apart, produced decisively greater yields than those with rows farther apart. Potatoes sprouted in the open air produced decisively higher yields in all cases than did those sprouted under shade, while yields from both whole tubers and cut sets increased as the weight of tubers and sets was increased from ½ oz. each to ¾ oz. and then to 1 oz. each.

Variety tests are reported with paddy, jute, and sugar cane.

Planting experiments at the agricultural experiment station, Zimbiti (Mozambique), W. H. JOHNSON (*Trop. Life, 5* (*1909*), *Nos. 6, pp. 84, 85, figs. 2; 8, pp. 122–136, figs. 7*).—A brief account of the establishment and work of this station is given.

In a variety test of cotton the Peeler and Bailey long staple upland cottons produced the highest yields of seed cotton (about 725 kg. per hectare or 645 lbs. per acre), with lint percentages of 33.99 and 33.07, respectively. Among the 4 short staple upland cottons the King variety produced the highest yield, 635.2 kg. of seed cotton per hectare, and also the highest lint percentage, 35.26. Only one of the 16 long staple upland cottons yielded less than 30 per cent of lint to

seed cotton. Two sea island cottons failed to make any yield, and the lint of Egyptian varieties was inferior.

In a test of 11 varieties of maize, the maximum yield of 1,960 kg. of dry grain per hectare was produced by the White Bango variety. Seeds of 32 varieties of tobacco were sown, and seedlings of 27 varieties were successfully transplanted, of which 22 produced leaf fit for curing and produced an average of 225 kg. of cured leaf per hectare. The maximum yield, 464 kg. per hectare, was produced by the Long Leaf Gooch variety.

Notes on rubber, miscellaneous crops, and animal and insect pests, are followed by tables showing the rate of planting, the dates of planting, germination, flowering, fruiting, and harvesting, the preparation of land, rate of yield, notes on insect pests, and other data for each variety of ground nuts, cowpeas, cotton, tobacco, maize, sesamum, and other crops planted.

Culture and composition of Arachis hypogea and Voandzeia subterranea, P. Boname (*Sta. Agron. Mauritius Bul. 21, 1909, pp. 34*).—These 2 crops are discussed and compared as nitrogen gatherers and many analyses of each are given.

For the ordinary peanut, analyses show the composition of samples as secured in the market, and of the ash from these samples. Analyses of the Jumbo and Virginia varieties indicated a slightly higher nitrogen content and ratio of kernels to hulls in Jumbo, which was also markedly higher in cellulose and sugar content. Analyses are also given of the kernels from which the oil has been pressed, of the stems and foliage, and of the ash content of each.

The pistache Malgache, as it is called in France, or Voandzou, as it is called in Madagascar, has the same cultural requirements as the ordinary peanut, and a similar but less abundant foliage, but is said to be less efficient as a nitrogen gatherer. Analyses are given of the green and mature plants and showing the proportion of kernel to hull in the fresh material and in the dry matter, and of the kernels, hulls, entire fruit, and foliage, and the ash of each. The ratio of nitrogenous and nonnitrogenous material varies little from the green plant to complete maturity. The ordinary peanut has a higher content of phosphoric acid and nitrogen and a lower content of potassium than has *V. subterranea*.

Prickly comfrey as a forage crop, H. N. Vinall (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 47, pp. 9, figs. 2*).—This circular states in a concise form the experimental results obtained with this crop at several state experiment stations with a brief description of the plant and directions for its culture, intended to enable prospective growers to determine its probable value for their purposes.

Corn, P. H. Rolfs (*Fla. Sta. Bul. 100, pp. 13–26, figs. 4*).—A brief statistical study of the Florida corn crop during recent years is followed by a study of varieties and descriptions of varieties, based on ears raised from seed derived mainly from various parts of Florida. Variety tests during the past seven years have indicated that northern bred corn is too soft and starchy for ordinary Florida purposes, as it is subject to mold and decay early in the year and is badly attacked by weevils and other insects. Its large yield, however, makes it profitable to devote a small area to it. Directions for the selection, testing, purchase and storage of seed corn are followed by instructions for the preparation and fertilization of the land and cultivation of the crop.

Testing seed corn by specific gravity, H. A. Dunn (*Proc. Ind. Acad. Sci., 1908, pp. 103–105*).—A specific gravity test in a solution of 1 part of glucose in 3 parts of water is described. All kernels that float in such a solution are termed light, and discarded.

Ears that tested "extra strong," "good," and "worthless" in the ordinary seed box germination test were tested by this specific gravity method. For the "extra strong" ear, the 9 per cent of light kernels and 91 per cent of heavy

kernels indicated by the specific gravity test, showed a germination test of 100 per cent in each case. From 300 kernels taken from the "good" ear, 258 heavy grains had a germination percentage of 89, while the 42 light grains had a germination percentage of 69. Of 68 heavy kernels from an ear whose box germination test had shown 4 dead kernels and 1 weak one out of 5, 47 per cent germinated, while of the 32 light kernels 15½ per cent germinated. In a further test of 2,116 kernels from ears that failed to germinate in the box test, 54 per cent of the 592 heavy seeds germinated, while only 22 per cent of the 1,524 light kernels germinated. A field test showed a difference in yield of about 3 bu. per acre in favor of the heavy seed as separated by the glucose solution.

Report of work in corn pollination, M. L. FISHER (*Proc. Ind. Acad. Sci., 1908, pp. 133, 134*).—During 1908 six studies were carried out in duplicate, of which the results of two studies are here reported.

Reid Yellow Dent fertilized with pollen from Stowell Evergreen produced no observable variation save a somewhat broader kernel, which might occur without crossing. Fertilizing with pollen from a speckled variety produced no change save for a few whitish crowns. The pollen used was from tassels plucked in the afternoon, sent through the mail, and used the following morning.

When silks of Boone County White were pollenized with pollen from Reid Yellow Dent, well-filled ears with white crowns, yellowish kernels, somewhat shorter than the usual Boone County White kernel, were obtained but this last variation may have been due to extreme drought. The other characters of the ear were unchanged. Three 5-ear lots were pollenized in duplicate with pollen 24, 48, and 72 hours old, respectively. The 24-hour old pollen produced well-filled rows in all ears, while that 48 hours old left many vacant places, although the ears were fairly well filled. Practically no fertilization resulted from pollen 72 hours old, the best ears containing but 8 or 10 kernels per cob.

Cultivation of peanuts, R. G. OSÉS (*Estac. Cent. Agron. Cuba, Bol. 18, pp. 19*).—Descriptions are given of several varieties of peanuts and directions for their cultivation, harvesting, and preparation for market, together with a statement of the soil requirements of the crop, and directions for seed selection. Estimates of the profits of the crop in Cuba are also included.

Potato culture on irrigated farms of the West, E. H. GRUBB (*U. S. Dept. Agr., Farmers' Bul. 386, pp. 13, figs. 3*).—In this paper the author, a practical potato grower of Colorado, discusses the preparation of the soil for potatoes, planting by means of machines, relative merits of cutting the seed and of planting whole tubers, cultivation, irrigation, storage, marketing, seed selection, selection of varieties, and possible yields.

The anatomical structure of the sugar beet in its relation to breeding practice, J. MÖLLER (*Bl. Zuckerrübenbau, 16 (1909), No. 19, pp. 289–294*).—A bibliography and review of recent work on the histological, physiological, microscopical, and polarization studies bearing upon the improvement of the sugar beet.

Growing sugar beet seed in South Dakota, J. H. SHEPARD (*South Dakota Sta. Bul. 117, pp. 597–609, figs. 4*).—This is a continuation of the cooperative work with this Department previously noted (E. S. R., 20, p. 233), and reports results with the home-grown seed produced in 1908 and with the new varieties of seed sown during the year.

In the final selection no mother beets were retained which fell below 15 per cent sugar, while in some instances all below 18 per cent were rejected. Of the 26 varieties planted in 1908 only the 6 hardiest and most promising ones were retained. Four of these showed a maximum sugar percentage of 19.8 per cent. New lots of seed obtained this year were divided into 2 parts to pre-

vent a complete loss through failure of the seed at any one point, and to demonstrate its adaptation to different cultural regions of the United States.

The results with new lots of seed planted in 1908 were materially influenced by an early, moist, and prolonged growing season which lowered the average sugar content and increased the proportion of beets rejected.

Seedling canes and manurial experiments at Barbados, 1906–1908 (*Imp. Dept. Agr. West Indies Pamphlet 59, pp. 101*).—Previous work at this station has been noted (E. S. R., 20, p. 233).

During 1906–1908 experiments were conducted on 12 black soil estates and 3 red soil estates. In a variety test of cane in comparison with the White Transparent variety, Sealy Seedling produced an increased yield of 6,184 lbs. of Muscovado sugar per acre, valued at $24.89, B3412 an increased yield valued at $17.57, B1521 $49.50, B3696 $16.31, and B3405 $59.50. A total increased yield from the plants and first rattoons of $73.27 was secured from B1386, and of $58.50 from B1566. Total increased yields of $115.14 and $100.27 were secured from B3390 and B3412, respectively, during the period 1904–1908.

Of the 219 seedling canes planted in 1906, 22 reached the required standard in field characteristics and in purity and richness of juice, and were retained for planting at the close of 1908. At the end of 1907, 6,690 seedlings were obtained, of which 4,099 were transplanted for further test.

A list of selected varieties for 1908 is given with a description of each, together with its chief mean results per acre, including yield, pounds of saccharose per gallon, quotient of purity, and glucose ratio.

None of the 5 varieties of seedling canes obtained by artificial hybridization or of the 6 varieties obtained by self-fertilization proved superior to the newer seedlings now under cultivation.

At the Dodds botanic station plats low in fertility were enriched by an application of 20 tons per acre of barnyard manure. Experiments were also conducted in which barnyard manure was applied at twice this rate and in which commercial fertilizers were applied to determine the relative values of various sources of nitrogen, potash, and phosphorus. The results showed that the application of nitrogen as dried blood, nitrate of soda, or sulphate of ammonia, gave a profitable increase of yield. Sulphate of ammonia proved superior to nitrate of soda, and under some circumstances the organic form of nitrogen found in dried blood was thought to equal sulphate of ammonia. The most favorable rate of application of nitrogen was from 40 to 60 lbs. per acre. The yield of sugar appeared to decrease with the application of superphosphate. A profitable increase of yield was obtained by the application of 60 lbs. per acre of potash as sulphate. Greater profit arose from the application of half of this sulphate in January and the remainder in June than from the application of the entire amount in January.

Agricultural work for the season between 1906–1908 at Barbados, J. P. D'ALBUQUERQUE and J. R. BOVELL (*Rpt. Agr. Work Barbados, Imp. Dept. Agr. West Indies, 1906–1908, pp. 4–109*).—This report presents the same conclusions as noted above but includes more extended tabulated data from the investigations on which they are based.

Report on turnip manuring experiments, 1908, R. B. GREIG (*Aberdeen and No. of Scot. Col. Agr. Leaflet 7, pp. 6*).—A mixture of $\frac{6}{7}$ cwt. sulphate of ammonia, $5\frac{5}{7}$ cwt. superphosphate, and 1 cwt. sulphate of potash produced an increase of 9 tons 15 cwt. of turnips per acre. When the potash was omitted the increase over the check plat was only 5 tons 6 cwt. On omitting the phosphate the increase was 2 tons 4 cwt., and omitting the nitrogen resulted in an increase of 7 tons 10 cwt. The use of superphosphate alone showed an increased yield of 5 tons over the check plat, but of only 1 ton 15 cwt. on plats

fertilized with dung. Applications of more than 3 or 4 cwt. of superphosphate appeared to be unprofitable, except as to their residual value. Phosphoric acid in high grade and in low grade slag appeared equally advantageous, except that the low grade slag had an apparent advantage on land deficient in lime.

[Rothamsted wheat experiments of 1909], J. J. WILLIS (*Gard. Chron., 3. ser., 47* (*1910*), *No. 1202, pp. 20, 21*).—The experiments during 1909 followed the general plan previously noted (E. S. R., 7, p. 381).

During 1909 the production of wheat was in every case below the average yield. The decrease ranged from 2 bu. per acre on the plat receiving no farmyard manure to 6⅝ bu. on the plat receiving superphosphate, potash, and 200 lbs. sulphate of ammonia. The yield of straw ranged from 50¾ cwt. per acre on the plat receiving farmyard manure to 9¼ cwt. on the plat without manure. The wheats were poorly developed because of insufficient warmth during the ripening period, and the proportion of offal to dressed grain was large, reaching 30 per cent of the whole in some cases. The proportion of grain to straw ranged from 30.4 to 58.7 per cent. The quality of the grain on the plat which has received no manure for 70 years showed no decrease in spite of the soil exhaustion which resulted in a yield of only 9⅛ bu. per acre. The value of a supply of potash was indicated by an increased yield of 9¼ bu. of wheat and 10 cwt. of straw per acre, resulting from its application, while on another plat it produced an increase at the rate of 12¾ bu. of grain and 13 cwt. of straw as compared with plats receiving phosphoric acid and nitrogen without potash.

Some varieties of wheat (*Estac. Agr. Cent. [Mexico] Bol. 32, pp. 78, pls. 41*).—This bulletin gives full descriptions of 49 varieties of wheat common in Mexico and certain other countries, particularly Egypt, Australia, and France.

The hybrid wheats, W. J. SPILLMAN (*Washington Sta. Bul. 89, pp. 5–27, figs. 6*).—This bulletin contains a history of the inception, progress, and results up to the present time of an investigation undertaken for the purpose of producing a hardy winter wheat with stiff straw and close chaff. The principal results have already been noted from another bulletin (E. S. R., 20, pp. 537).

In the case of reciprocal crosses, the results were exactly the same whichever parent grew the seed. The law of recombination is enunciated and discussed in full. "The writer claims only to have discovered the fact that in the second generation of a hybrid every possible combination of the original parent character occurs." Reports are given from a number of Washington farmers indicating that the hybrids resulting from the work were producing yields considerably in excess of those of standard varieties and were being utilized over a considerable area of the wheat growing sections of the State.

Hybrid wheats, R. W. THATCHER (*Washington Sta. Popular Bul. 21, pp. 4, fig. 1*).—A popular edition of the above.

Judging and commercial grading of small grains and hay, C. S. KNIGHT (*Univ. Nev. Col. Agr. Dept. Agron. Bul. 1, pp. 5–35*).—This bulletin presents standards of perfection and student's score cards, with full explanation of each, for wheat, oats, and barley, and a score card for alfalfa hay. The rules adopted by the Minneapolis and Duluth Grain Inspection Boards in September, 1908, for the commercial grading of grain, and the Chicago Board of Trade rules for the inspection of hay and straw, are also given.

HORTICULTURE.

Fertilizer experiments with lime nitrogen, sulphate of ammonia and nitrate of soda for cabbage, WEHNERT (*Landw. Wchnbl. Schles. Holst., 60* (*1910*), *No. 4, pp. 71, 72*).—Plat experiments on different kinds of soil are reported. The nitrogenous fertilizers were used in connection with liquid manure,

Thomas slag and 40 per cent potash salt. In two out of three cases the highest yields and greatest profits were obtained with the lime nitrogen.

Suggestions for defense against spring frosts, L. Degrully (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 31 (1910), No. 13, pp. 193–196*).—A popular summary of practices employed in Europe for protecting vineyards against late spring frosts.

The pruning of apple trees, W. S. Thornber (*Washington Sta. Popular Bul. 24, pp. 4*).—This contains brief instructions for pruning and training apple trees during the first 4 or 5 years of their growth, and for the pruning of bearing trees.

Origin and synonymy of the olive varieties of Istria and Trentino, C. Hugues (*Bol. Quind. Soc. Agr. Ital., 15 (1910), No. 2, pp. 52–59*).—In this paper the author endeavors to work out the history and synonymy of a number of varieties of olives growing in Istria and Trentino.

Propagation of mangoes, W. E. Hess (*Porto Rico Hort. News, 3 (1910), No. 2, p. 19*).—As a result of experiments conducted during the season of 1909, the author reports success in the production of inarched mango plants of choice varieties ready to plant in the orchard within 3 months from the seed. His method of procedure is described. An important aid to early germination appears to be the removal of the kernels from the husk before planting. Seedlings thus grown were ready for inarching 45 days after planting.

The limitation of the Satsuma orange to Trifoliate-orange stock, W. T. Swingle (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 46, pp. 10, pl. 1, figs. 6*).—In view of the large experimental and prospective commercial plantings of the Satsuma orange in many of the Gulf States, this circular contains a warning to planters not to purchase the Satsuma orange budded on sour-orange stock, since the Satsuma succeeds well only when budded on Trifoliate-orange stock.

A simple method for identifying with certainty Trifoliate stock, which was discovered in 1887 by O. Penzig, director of the botanic garden at Genoa, Italy, is here described. This consists in an examination of a longitudinal section of the pith of the stock, which, if Trifoliate, will show characteristic thick-walled pitted cells that make up the imperfect cross partitions. There is an absence of these thick-walled cells in the sour orange and other citrus fruits. In case of doubt this Department offers for the present to determine whether or not purchased stock is the Trifoliate orange.

Citrus fruits in Texas, H. H. Hume (*Texas Dept. Agr. Bul. 3, pp. 55, figs. 28*).—At the request of the Commissioner of Agriculture of Texas, the author investigated the possibilities of citrus fruit growing in the gulf coast country of that State. The present bulletin comprises a report on this investigation.

Part 1 contains notes on the history and present condition of a large number of individual citrus trees, growing in different parts of the coast country, as well as on orchard plantings which have been made, soils, climate, and citrus stocks. The author concludes in brief after considering the whole matter in relation to climatic conditions that citrus fruits have been, are being, and will be grown in the gulf coast region of Texas. It is believed that the Satsuma will be the principal orange grown. Part 2 has to do with citrus culture. It discusses setting out the orchard, cultivation, pruning, protection against cold, fertilizers, varieties, and handling the crop.

Cocoa experiment plats, W. M. Malins-Smith (*Proc. Agr. Soc. Trinidad and Tobago, 10 (1910), No. 1, pp. 11–14*).—The relative values of a number of complete manures and fertilizer combinations were tested on 1-acre cacao plats which previous to the tests had yielded as high as 5 bags of 180 lbs. each per acre. The experiments tend to show that with judicious manuring

the above yield can be easily increased by 50 per cent with a considerable increase in profits.

The cultivation of coffee, H. V. JACKSON (*Dept. Agr. N. S. Wales, Farmers' Bul. 4, pp. 8, figs. 7*).—This consists of popular notes on coffee culture prepared with a view of stimulating the industry in New South Wales.

Yerba mate or Parana tea, O. WARBURG and F. WOHLTMANN (*Tropenpflanzer, Beihefte, 11 (1910), No. 1, pp. 63, figs. 13*).—This report, which is prepared from official data collected by E. Heinze, German Consul for the State of Parana, relative to the yerba mate industry in the State of Parana, Brazil, is intended to supplement previous accounts of the yerba mate industry in South America, such as that by Neger and Vanino (E. S. R., 15, p. 365). Information is given relative to the literature and sources of yerba mate, the production of the raw material, preparation and export of the tea, economic status, and recent statistical information relative to the industry.

Investigations in connection with the African palm oil industry (*Bul. Imp. Inst., 7 (1909), No. 4, pp. 357–394*).—This consists of a summary of various reports on the palm oil industry made by the director of the Imperial Institute to the British West African colonies. It contains information relative to areas occupied by the oil palm (*Elaeis guineensis*) in West Africa, its distribution in the different colonies and countries, the relative values of the several varieties for the production of palm oil and palm kernels, and the methods used for the extraction of these products.

Green manuring in the Tropics, J. S. J. MCCALL (*Nyasaland Agr. and Forestry Dept. [Pub.], 1909, No. 2, pp. 4*).—A brief popular pamphlet setting forth the importance of green manures for soil improvement with special reference to their use in connection with coffee, rubber, and other tropical crops.

Trees in Washington, W. S. THORNBER (*Washington Sta. Popular Bul. 23, pp. 4*).—As a result of extended tests made by the station of shade, forest, and ornamental trees, more than 100 trees have proved themselves valuable for conditions in the State. Suggestions are here given relative to propagating, transplanting, and care and cultivation of trees, together with lists of trees most worthy of mention, and those suitable for special purposes.

FORESTRY.

Surface conditions and stream flow, W. L. HALL and H. MAXWELL (*U. S. Dept. Agr., Forest Serv. Circ. 176, pp. 16*).—An examination of the flow of 10 important rivers of the United States on which careful records have been kept for periods ranging from 16 to 34 years, shows a steady increase in the number and duration of floods during this period. This circular discusses the various causes which might increase flood conditions, such as precipitation, evaporation, temperature, topography and geology, natural and artificial reservoirs, soil, and ground cover, and attributes the principal causes of increased floods to the clearing away of the forests on the mountainous watersheds of the streams described, together with the repeated burning over of forest lands, thereby reducing the thickness and value of the ground cover, lessening the power of the soil to absorb and store water, and destroying the undergrowth and brush, finally resulting in erosion and rapid run-off of water. The watershed of the Cumberland River is discussed as one where conditions have grown worse, and that of the Red River as one where conditions have grown better.

The reforestation of sand plains in Vermont, C. D. HOWE (*Bot. Gaz., 49 (1910), No. 2, pp. 126–148, figs. 15, map 1*).—This is a study in the succession of forest types on sand plains bordering on Lake Champlain. Consideration

is given to the geology and original forest conditions of these areas, which the author states were originally covered with white, pitch, and Norway pine. The succeeding forest types on cut-over areas and abandoned cultivated fields are discussed in detail. The conclusion is reached that pitch pine succeeded to the control of areas from which the dominant white pine had been removed. White pine, however, is gradually regaining its control on cut-over areas, as well as on abandoned fields, by its actual replacement of white birch stands and by its probable displacement of the pitch pine stands.

Reproduction of western yellow pine in the Southwest, G. A. PEARSON (*U. S. Dept. Agr., Forest Serv. Circ. 174, pp. 16*).—Although the artificial reforestation of denuded areas with western yellow pine is considered impracticable at present, a study made by the Forest Service in 1908 indicates that proper methods of management will insure a satisfactory second growth. The factors influencing reproduction, including temperature, soil, and air and soil moisture, together with methods of cutting, brush disposal, grazing, and fire, are discussed and suggestions are given for the proper management of these yellow-pine areas to secure favorable reproduction. The ideal management for the western yellow pine in the Southwest is said to be by means of the shelterwood system, where relatively light preliminary cuttings will stimulate reproduction and can be followed by the removal of the rest of the stand as soon as the second growth has established itself.

Accretion investigations with oaks, W. KLEMME (*Allg. Forst u. Jagd Ztg., 86 (1910), pp. 4–9*).—An investigation similar to that previously noted for firs (E. S. R., 19, p. 746) is reported relative to the age and growth accretion of over 4,000 oaks growing in the state forests of Alsace-Lorraine. The results are presented in tabular form and discussed.

British oaks, C. E. MOSS (*Jour. Bot. [London], 48 (1910), Nos. 565, pp. 1–8, pl. 1, fig. 1; 566, pp. 33–39*).—The author presents evidence to show that *Quercus robur* and *Q. sessiliflora*, instead of being identical as they are usually considered, differ in botanical structure, habitat, and range.

Burmese in wood (Dipterocarpus tuberculatus) R. S. TROUP (*[Indian Forest Dept.] Pamphlet 13, Forest Econ. Ser. 6, pp. 24, pls. 3, map 1*).—An account of this species relative to its nomenclature, distribution, associating species, habits of growth, natural and artificial reproduction, distinguishing characteristics, size and quality of timber, physical properties of the wood, exploitation, yields and returns, and uses of the wood and minor products.

Wattle growing for bark, L. E. TAYLOR (*Transvaal Agr. Jour., 8 (1910), No. 30, pp. 235–241, pls. 5*).—The methods for growing wattle are discussed under the general headings formation of plantation, utilization, regeneration, and protection.

Report on the rubber trees at Nilambur and Calicut, South Malabar, R. L. PROUDLOCK (*Madras, 1908, pp. XII+50, pls. 14, chart 1*).—This report contains information relative to the history, growth, and condition of a number of rubber trees growing at Nilambur and Calicut, including information relative to the soil and climatic conditions as well as recommendations for the development of the rubber industry in these regions.

Rubber culture in the Dutch Indies, P. J. VAN HOUTEN (*Indische Mercuur, 33 (1910), Nos. 1, pp. 1, 2; 2, pp. 19–22*).—An address in which the history and development of the rubber industry in general is reviewed and an account given of the present status of rubber culture in the Dutch Indies.

Germination tests of forest seeds, INGEBORG JACOBSEN (*Centbl. Gesam. Forstw., 36 (1910), No. 1, pp. 22–28*).—The average results secured for the 5-year period ended in 1907 at the Danish Seed Control Station, Copenhagen, in tests of a large number of coniferous and deciduous forest seeds are given. The

data show the number of tests, weight per thousand seeds, germination energy, germination power, purity and duration of test. The apparatus and methods used in analyzing and testing the seeds are also described and discussed.

Investigations on the pruning of forest trees, E. ZEDERBAUER (*Untersuchungen über die Aufastung der Waldbäume. Vienna, 1909, pp. 17, pl. 1*).—These studies have been previously noted (E. S. R., 22, p. 44).

How to make improvement thinnings in Massachusetts woodlands, H. O. COOK (*Boston, 1910, pp. 21, pls. 9*).—A popular treatise on this subject containing data and illustrations taken from actual thinning experiments conducted under the direction of the Massachusetts State Forester. It discusses the importance, theory, practice, results, and practicability of thinning, and gives suggestions relative to making thinnings in woodlands infested with the gipsy moth.

In conclusion a report on the conditions, methods of work and financial results secured in connection with the experimental thinning of a white pine woodlot in Warwick, Mass., is given. J. J. Dearborn, who carried on the latter work, concludes that it is possible to thin out a pine grove 50 years of age with an additional cost of not over 15 cts. per thousand b. m. feet for the chopping and 15 cts. per thousand b. m. feet for the logging under ordinary conditions.

A study of the Massachusetts wood-using industries, H. MAXWELL (*Boston, 1910, pp. 38*).—A statistical study directed jointly by the Forest Service of this Department and the State of Massachusetts, and including only those industries in which lumber undergoes further processes of manufacture after leaving the sawmill. The data for each industry shows the kind and quantity of lumber used annually, average cost per thousand, and total cost at the factory, as well as the amount and average cost of lumber grown in and outside of Massachusetts. The data is also summarized by industries and by species. A list of the wood manufacturers and another showing the principal purposes for which each of the 54 different woods is used are appended.

Investigations on the elasticity and strength of Austrian building timbers (*Mitt. Forstl. Versuchsw. Österr., 1900, No. 25, pp. VII+161, pls. 21, figs. 15; 1904, No. 28, pp. VI+313, pls. 15, figs. 13; 1909, No. 35, pp. VIII+217, pls. 4, figs 14*).—The Mariabrunn Forestry Station is conducting a series of studies on the technical qualities of Austrian building timbers with a view of working out the relations between elasticity and strength and the moisture content and specific density of the woods, as well as to determine the influence of various growth conditions upon the technical properties and to work out the relationship between technical properties and the exterior and easily ascertained characteristics of wood. The present series of reports contains an account of experimental work conducted with spruce timbers from various parts of Austria, dealing respectively with spruces of south Tyrol by A. Hadek and G. Janka, spruces of north Tyrol, Wienerwald and Erz-Gebirge by G. Janka, and spruces from the Carpathians, Böhmerwald, Ternovanerwald and the Central Alps by G. Janka. In addition to the experimental data on tests of timber from the above regions, the last report also contains a discussion of the technical qualities of spruce timbers in general, including compiled tables based upon the results of the spruce investigations as a whole.

Impregnation of wood, K. L. F. FRIEDMANN and W. A. G. VON HEIDENSTAM (*Danish Patent 12419, Jan. 22, 1909; abs in Chem. Ztg., 33 (1909), No. 139, Repert., p. 598*).—The wood is treated in a tank with creosol-calcium solution and then exposed to the air or to the gases of a steam boiler in order to bring about a precipitation of the creosol in the outer layer of the wood, and further

to form a layer of calcium carbonate over it. The creosol-calcium is easily soluble in water.

Impregnation of beech ties with copper arsenite, N. von Lorenz (*Imprägnierung von Buchenschwellen mit arsenigsaurem Kupferoxyd. Vienna, 1909, pp. 5*).—Noted from another source (E. S. R., 21, p. 640).

The use book: Grazing (*U. S. Dept. Agr., Forest Serv., 1910, pp. 84*).—This is the fourth revision of that portion of the regulations and instructions for the use of the National Forests (E. S. R., 19, p. 147) relating to the grazing of live stock, and took effect January 1, 1910.

DISEASES OF PLANTS.

Researches on fungi, A. H. R. Buller (*London, New York, Bombay, and Calcutta, 1909, pp. XI+287, pls. 5, figs. 83*).—Part I of this work includes investigations of the production, discharge, and dispersal of the spores of the Hymenomycetes treated botanically and physically. Part II is a similar treatment of the Ascomycetes. The following is a summary of a few of the more important results obtained:

The spores of the Hymenomycetes are very adhesive when freshly liberated. Paraphyses are useful as spacial agents. Direct sunlight injures the vitality of the dry spores of certain species. Spores falling from a fruit body suspended in a closed beaker can be seen in clouds or individually without magnification by using a concentrated beam of light. Fruit bodies of corky or leathery consistency are xerophytic, for when revived after drying, they resume the function of discharging spores; the spores liberated are viable.

The four spores on each basidium are forcibly and successively discharged. Each spore is shot out horizontally from its sterigma to a distance of about 0.1 mm., with an initial velocity of 40 cm. per second, but is rapidly checked by the resistance of the air, in consequence of which the spores describe a sharp curve called the "sporabola" and then fall vertically to the ground if in still air. The specific gravity of certain species ranges from 1.02 to 1.21. The falling spores are claimed to be electrically charged.

The parasitism of fungi, E. W. Schmidt (*Ztschr. Pflanzenkrank., 19 (1909), No. 3, pp. 129–143, figs. 7*).—An attempt is made to prove that the entrance of the germ tubes of parasitic fungi into the tissues of their hosts is due to chemotropic influences. Experiments were conducted with artificial cells arranged as follows:

A sack with walls made of celloidin was, by means of a glass rod, so suspended inside of a flask, on the bottom of which was a thin layer of gelatin, that the bottom of the sack was a slight distance from the gelatin layer. The sack was filled about two-thirds full of plum extract gelatin and the whole apparatus sterilized. Spores from pure cultures of the pear Phyllosticta were then placed on the gelatin layer at 1.5, 2.5, 3.5 cm. from the sack, the flask closed and the growth of the 3 resulting colonies observed.

The colony nearest to the sack at the end of 11 days had reached the bottom of the sack, and by the end of 23 days the lower portion of the sack was covered with a dense growth of hyphæ, many of which had penetrated through the celloidin walls and into the nutrient solution within. The other colonies did not show any appreciable turning of their growth zones toward the sack. The fungi in the sack continued to grow until fruit bodies were formed.

The author claims that the celloidin walls represent cell walls; the nutrient solution, the chemotropic cell substance; and the growth toward and through the celloidin walls, the infection germ tubes of fungus spores when they first

penetrate into the tissues of the host. He, therefore, concludes that the original entrance of germ tubes into the host is due to chemotropic influences.

The dissemination of disease by means of the seed of the host plant, M. F. Barrus (*Proc. Ind. Acad. Sci., 1908, pp. 113–122, pls. 3*).—This is an abstract of a thesis in which the author gives data regarding a number of diseases which are transmitted from crop to crop through the seed. These diseases are divided into two classes, (1) those in which the organism enters the maturing seed and exists within in a dormant condition until the germination of the seed, and (2) those which adhere to the surface of the seed, entering the host plant at the time it germinates.

The diseases described are bean anthracnose (*Colletotrichum lindemuthianum*), sunscald of pea (*Ascochyta pisi*), loose smut of wheat (*Ustilago tritici*), naked smut of barley (*U. nuda*), stinking smut of wheat (*Tilletia fœtens* and *T. tritici*), loose smut of oats (*U. avenæ*), hidden smut of oats (*U. lævis*), covered smut of barley (*U. hordei*), the smuts of a number of other plants, flax wilt (*Fusarium lini*), bacterial blight of beans, black rot of cabbage, and Stewart's bacterial disease of corn. In addition it is suggested that some species of rusts may be carried over in a similar manner.

Some Fusarium diseases of plants, K. von Tubeuf (*Mitt. K. Bayr. Moorkulturanst., 1908, No. 2, pp. 38–62, pl. 1, figs. 4*).—A summary is given of investigations on the diseases of plants due to various species of Fusarium, after which the species attacking grasses and common cereals are described at some length. Among the species occurring on these hosts are *F. heterosporum, F. tritici, F. culmorum, F. hordei, F. lolii*, etc.

The perithecial stages of Fusariums are discussed at some length and notes are given on the color changes observed in different species.

The heterœcious plant rusts of Indiana, A. G. Johnson (*Proc. Ind. Acad. Sci., 1908, pp. 87–94*).—The author briefly shows the results of investigations in connecting various forms of rusts with their different host plants, and gives the life histories of 34 species of rusts represented in Indiana. The æcidial stages of a number of others are not yet known and the teleutospore stages of a considerable number of species are not yet recognized.

International statistics of the grain rusts, P. Sorauer (*Ztschr. Pflanzenkrank., 19 (1909), No. 4–5, pp. 193–286*).—This is a comprehensive investigation and compilation of data on the grain rusts of the world.

The material is arranged in the following manner: (1) Events which illustrate the severity of the rust at certain seasons or periods. This includes instances of severe rusting in which the entire crop of grain was practically destroyed, and those in which the plants were badly rusted but a fair crop was harvested in spite of the rust. (2) Theories as to the means of infection and propagation of the rust that have been advanced by various writers. Eriksson's experiments on which he based his mycoplasm theory as to primary infection are given, and results obtained by various workers from inoculations of æcidio, uredo, and teleutospores on different host plants are noted. (3) The influence of the weather on the origin and distribution of the rusts. The effects of rainfall, sudden changes of weather, and the weakened condition of the grain plants due to hail, drought, humidity, insect injuries, frost, or other debilitating agencies, are each given due attention. (4) The location and nature of the soil in reference to the appearance of the rusts. Here are set forth the data as to the different kinds of soils (clay, sand, loam, etc.), subsoils, and location as to drainage and their probable bearing, if any, on the rusting of cereals grown on them. (5) The influence of cultural methods on the severity of rust attacks. The subdivisions under this heading are good seed, thickness of stand, seed

time, preceding crops, and fertilizers. The data under each head are tabulated and discussed. (6) The susceptibility of different varieties of grain to the attacks of the rust. Nonresistant varieties of various grains are mentioned and the extent of rust damage to each. Resistant varieties are named and their degree of immunity indicated.

After a careful study of the data included under these six headings, the conclusion is reached that grain rust is a "disposition" disease and the question is one that must be solved by breeding rust-resistant varieties of the various cereals.

The parasitic Uredineæ of Japanese grasses, S. Ito (*Jour. Col. Agr. Tohoku Imp. Univ., 3 (1909), No. 2, pp. 180–265, pls. 3*).—Annotated lists and critical notes are given on the species of Uredineæ which have been found growing parasitically on Japanese grasses.

Some results and observations noted in breeding cereals in a specially prepared disease garden, H. L. Bolley (*Amer. Breeders' Assoc. [Proc.], 5 (1909), pp. 177–182*).—The author gives an account of work with flax and wheat to secure resistance to disease. He describes the methods under which his investigations were carried on and as a result of which he is led to believe that mass breeding for disease resistance is as successful as breeding by individual selections.

In the author's investigations the conditions for disease are made much more severe than would occur under ordinary field conditions. The results thus far obtained have shown that with flax varieties have been developed which have yielded from 16 to 30 bu. per acre upon soil on which for a number of years it had been impossible to grow flax on account of the wilt. Some similar results have been obtained with wheat, and it has been found that the uredospores of rust appear to confer some degree of immunity or resistance though it does not appear to be lasting. The resistance secured against uredospore attack has not proved of any value in preventing the attack by means of æcidiospores.

The author is led to believe, as a result of his work, that the æcidial stage of *Puccinia graminis* acts as a reinvigorator of stem rusts of wheat, and that on this account the barberries should be rigidly eliminated from wheat-producing regions.

A new disease of alfalfa in Austria, F. Bubák (*Wiener Landw. Ztg., 59 (1909), No. 93, p. 909, figs. 9*).—A description is given of the leaf spot disease of alfalfa, due to *Pleosphærulina briosiana*, that was observed in Austria during the summer of 1909.

The fungus produces two kinds of spots, small brownish-red or purplish spots, which are sterile, and larger, leathery-brown ones occurring on the leaf and involving considerable of its tissue. It is thought that this disease is probably identical with one observed some years before in northern Italy, although there are some differences in the spore character of the fungi. Associated with the Pleosphærulina in all the material examined was the imperfect fungus, *Ascochyta medicaginis*. The author believes it is possible that these two fungi may be closely related, but this remains to be determined.

Cotton anthracnose, H. W. Barre (*Science, n. ser., 31 (1910), No. 785, p. 68*).—As a result of the author's investigations it was found that seed taken from the field where anthracnose occurred the previous summer contained the fungus, and an examination of bolls showed the presence of the fungus beneath the seed coats and in the tissues of the cotyledons. In addition to the mycelium, spores were frequently found within the seeds.

Inoculation experiments indicated that the fungus seems to prefer the seed and lint to other portions of the plant, and in many cases these parts of the plant were attacked, with no indication of the fungus on the walls of the bolls.

When infected seeds were planted, diseased seedlings were produced, and the disease thus spread. A number of outbreaks of anthracnose in various sections of South Carolina were traced to the planting of diseased seed.

Studies have shown that it is impossible to isolate the fungus from material that has remained in the field as late as July 20. On the basis of this and other observations the author believes that it will be possible to eliminate the disease by a one year's rotation with disease-free seed.

The results of seed treatment, methods of infection, resistance, etc., are to be the subject of a report from the South Carolina Station.

A serious potato disease occurring in Newfoundland, H. T. Güssow (*Canada Cent. Expt. Farm Bul. 63, pp. 8, pls. 2, figs. 1*).—Attention is called to the rapid spread throughout European countries of potato canker (*Chrysophlyctis endobiotica*) and its recent (1909) observation in Newfoundland. The history, appearance in the field, damage caused by, and the pathology of the disease, are noted. In this disease the eyes of the tubers produce an abnormal cauliflower or warty outgrowth from the size of a pin's head to that of the potato itself. In many cases the entire potato is covered with a blackish mass of wrinkled warts.

Prevention, seeing that no diseased potatoes are used for seed, seems to be the best remedy. If the seed tubers are suspected, the sets should be powdered with sulphur at the rate of 4 or 5 lbs. to a ton of potatoes, and then stored in boxes until planted. When the disease has once appeared in a field, the diseased tubers should be collected and either burned or boiled. If boiled, they can be fed to the stock, but under no conditions should unboiled or decayed potatoes be fed, as the spores of the disease are capable of germinating after passing through the body of an animal.

In removing the potatoes from the field, great care should be taken to clean thoroughly and disinfect boots, carts, and implements. All refuse from the vines and all diseased tubers should be collected and placed in a hole upon a layer of unslacked lime 6 in. deep, covered with a layer of unslacked lime, and so on until the hole is full. If lime is not available, sawdust soaked in bichlorid of mercury 1 : 500, and mixed with the tubers in the hole may be used. When the land has been thus cleaned, it should be fallowed and treated with unslacked lime at the rate of 4 or 5 tons per acre, or sprayed with a solution of bichlorid of mercury, 1 : 800. In a four-year crop rotation the potatoes should be replaced by some other crop, as, so far as is known, the disease only attacks potatoes.

A warning is specially given to all potato growers to be on the watch for this disease, as it may be introduced on imported seed potatoes from European countries at any time.

Infection experiments with Chrysophlyctis endobiotica, the cause of the potato canker, G. Schneider (*Deut. Landw. Presse, 36 (1909), No. 88, pp. 940, 941, figs. 6*).—The author conducted a series of experiments relating to the growth, characteristics, and propagation of this disease.

It was found that the resting thick-walled sporangia withstood without injury a temperature of $-13°$ C. in the open air and thus were able to live through the winter and in the spring of the year infect the young potato plants. Remnants of diseased potatoes which were overlooked and left in the field were often affected by the dry rot and crumbled, but the thick-walled sporangia remained uninjured in the soil, and were a source of infection to the new crop. The disease enters through the eyes of the potato when the tubers are young and spreads from cell to cell by its plasmodia. By this means the stems, shoots, and often the leaves finally become diseased. There was no difference observable in the growth of the tops of those potato plants in which tubers were diseased and of those which were healthy. The disease was not affected

by the kind of soil in which the potatoes were grown, as clay, sand, and rich loam were alike subject to attack. Artificial inoculations on the tops of the potato plants produced no infection. The warty growths on the potato tubers are first white, then yellowish brown, and finally black in the last stages. The diseased leaves are thickened, stunted, and covered with small warts.

Remedies suggested are the rotation of crops and the sorting of the potatoes, cooking the diseased ones for cattle feed and storing the healthy ones in a cool, dry place. Seed potatoes should be used that are known to be healthy and should be planted in uninfected soil. Houses where potatoes are stored and handled should be some distance from the fields.

A discussion of the leaf roll disease of the potato, E. W. SCHMIDT (*Deut. Landw. Presse, 36 (1909), No. 99, p. 1051*).—Various experiments were conducted by the author to determine the character of the leaf roll disease of the potato. He finds that the fungus present in the diseased leaves will not grow on healthy plants, and that all attempts to produce the disease by artificial cultures are unsuccessful. The fungus found in the diseased plants is claimed to be a saprophyte and, therefore, can not be the cause of the disease, which, he concludes, is probably due to physiological causes rather than to the work of any fungus parasite.

Two epidemics of potato blight and rot, W. J. MORSE (*Maine Sta. Bul. 169, pp. 165–184, pls. 2*).—This bulletin contains a discussion of epidemics of late blight or rot (*Phytophthora infestans*) of potatoes in Aroostook County, Me., in 1907 and 1909.

It is stated that much, if not all, of the disease comes originally from planting diseased seed tubers and that rain, dew, wind, insects, etc., are the chief agencies in disseminating the disease. It is especially destructive in rainy or cloudy weather, but can be controlled by thorough and persistent spraying with 5:5:50 Bordeaux mixture properly prepared and applied. The applications should commence when the tops are 6 to 8 inches high and be repeated every 10 days, or every week if the weather is cloudy, and should be continued until the frost kills the leaves. It was found that 50 gal., the amount usually recommended per acre, was not sufficient to insure protection when the plants were large and covered the ground. The spraying should not be omitted on account of rainy weather, as this is the one time when spraying is most needed.

It was also demonstrated on a large scale in 1909 that where potatoes are blighting, it is unsafe to dig or store the crop for at least 10 days after the tops are killed by frost, as the spores are showered down on the damp potatoes and infect them, thus causing decay in storage.

Bean anthracnose, H. VON DIAKONOFF (*Geisenh. Mitt. Obst u. Gartenbau, 24 (1909), No. 4, pp. 57–59, figs. 3*).—An account is given of the bean anthracnose, *Colletotrichum lindemuthianum*, or *Glœosporium lindemuthianum*, as the author calls it, with suggestions for its control. The principal means recommended is the selection of seed, all seeds showing any spots being rejected.

Investigations of the relation between the character of the ground and the appearance of the club root disease in Central Jutland, H. R. CHRISTENSEN ET AL. (*Tidsskr. Landbr. Planteavl, 16 (1909), No. 3, pp. 430–476*).—The authors conclude from investigations conducted during the summer of 1907 that where the club root disease is found and the soil appears to be acid and in need of liming, the attack should be combated by heavy applications of marl or lime. If the soil is not acid and the disease is still present, the best remedy is thorough drainage and improvement of the physical condition of the soil. When a soil is acid and the disease has not yet appeared, applications of marl and lime are to be recommended in order that the disease may not gain a foothold should the soil become infected with the fungus.

Apple diseases caused by Coryneum foliicolum and Phoma mali, C. E. Lewis (*Maine Sta. Bul. 170, pp. 185–200, pls. 13*).—This is an account of the cultural characters of these two fungi, together with the results of inoculation experiments which were made in order to determine their parasitism upon the leaves, wood, and fruit of the apple.

It is claimed that the two fungi under consideration, *C. foliicolum* and *P. mali*, usually attack as wound parasites the wood of young apple trees and the branches of old trees. *P. mali* can cause a rather rapid and complete decay of ripe apples and can also attack the green fruit to some extent, while *C. foliicolum* causes only a slight decay of the ripe fruit. Neither of these fungi has been found to cause disease in uninjured leaves, but they may occur on dead spots in apple leaves. It is stated that their distribution can be largely controlled by removing and burning the dead wood on which they occur.

A new disease, black mold, of the grapes in Russia, S. Mokrzecki (*Ztschr. Pflanzenkrank., 19 (1909), No. 7, pp. 387, 388, figs. 3*).—This disease appeared after the very cold winter of 1907 in several Russian provinces. It affected the blooms, appearing first as rose-colored spots on the sepals, which later turned brown. The sepals and entire inflorescence finally blackened, withered, and fell off. In several provinces the entire crop was destroyed, while in others it was only partially so. A microscopical examination by different mycologists failed to show any trace of fungi in the diseased tissues. It is, therefore, supposed to be due to physiological causes, and probably to the severe cold.

Two epidemics of mildew in Baden, K. Müller (*Ztschr. Pflanzenkrank., 19 (1909), No. 3, pp. 143, 144*).—In various portions of Baden in 1908, there was a serious epidemic of mildew (*Sphærotheca mors-uva*) on gooseberries, only the imported American varieties being attacked. In the summer of the same year the oaks were also affected by a mildew (Microsphæra) that did much damage to the trees.

The die back of cacao trees and the brown rot of cacao fruits, A. E. van Hall-de Jonge and A. W. Drost (*Dept. Landb. Suriname Bul. 21, pp. 15, pl. 1*).—The die back of cacao trees and the brown rot of the pods are said to be due to the same cause, and these diseases affect trees only when through attacks of insects, winds, lack of shade, or other means, the trees are in a leafless condition. The healthy pods are not attacked, but only those which have been injured in some way. Various fungi have been attributed as the cause of these diseases, but the author claims that they are due to *Diplodia cacaoicola* and that Chætodiplodia and Lasiodiplodia are synonymous with Diplodia.

For the prevention of the diseases the authors recommend the removing of all parts where the mycelium has spread and coating the wounds with tar.

The canker or red rot of cacao trees, A. E. van Hall-de Jonge (*Rec. Trav. Bot. Neerland., 6 (1909), pp. 1–25; Dept. Landb. Suriname Bul. 20, pp. 22, pls. 3*).—The author describes the canker of cacao trees due to the fungus *Spicaria colorans* n. sp. This disease has been known in Surinam for a considerable time and in 1907 caused great damage in certain cacao-growing districts. Besides the Spicaria fructification the fungus forms fruiting organs resembling those of Fusarium. The disease in Surinam is said to be in all respects similar to that occurring in Ceylon, Java, and elsewhere that has been attributed to species of Nectria, but the author claims that there has been no definite proof that Nectria causes the canker disease or that the Nectria occurs on the pods, as has been previously stated.

The witches' broom disease in Surinam, its cause and treatment, C. J. J. van Hall and A. W. Drost, trans. by A. Fredholm (*Proc. Agr. Soc. Trinidad and Tobago, 9 (1909), No. 12, pp. 475–564, pls. 17, dgms. 6*).—This is a trans-

lation of a publication previously noted (E. S. R., 20, p. 1141), with various alterations to bring the subject matter up to date.

A disease of Para rubber, H. N. RIDLEY (*Agr. Bul. Straits and Fed. Malay States, 8 (1909), No. 12, pp. 570, 571*).—A disease of Hevea has been described in a previous publication (E. S. R., 22, p. 248) and in the present publication a report is given of the determination by G. Massee of the fungus. This proved to be an undescribed species of Diplodia, to which the name *D. rapax* has been given. From its general structure, habit, and parasitic nature it is suggested that it is probably a stage in the life cycle of some species of Rosellinia.

The introduction of Septoria azaleæ into Silesia, R. EWERT (*Ztschr. Pflanzenkrank., 19 (1909), No. 6, pp. 321-324*).—In 1908 certain varieties of azalea in southern Silesia were found to be affected with a disease which attacked the leaves. The affected plants were imported from Saxony and the disease undoubtedly came from that region. A careful examination of the plants proved that they were infected with *S. azaleæ*, as the spots on the leaves showed the characteristic threads and fruit bodies of this fungus.

Mildew of the oak in Portugal and Madeira, C. TORREND (*Brotéria, 8 (1909), pp. 103-113*).—The author describes the mildew of oaks due to *Oïdium quercinum*, giving an account of its distribution in Portugal and its occurrence in Maderia.

The author believes that the mildew will not prove generally destructive, as oaks are not extensively grown in forests except in Portugal and there the cork oak seems more or less resistant to the mildew. It seems to attack many other species of oaks, the species introduced from America not being immune.

Notes on Oïdium quercinum, J. S. TAVARES (*Brotéria, 8 (1909), p. 76*).—A brief account is given of the occurrence of *O. quercinum* on oaks in Portugal.

A new disease of Picea, A. W. BORTHWICK (*Notes Roy. Bot. Gard. Edinb., 1909, No. 20, pp. 259-261, pl. 1*).—A brief account is given of a new disease of Picea, which attacks the buds of the trees, sometimes stopping their further growth, but if only one side of the bud is attacked, producing a twisted shoot. The diseased buds are encased in a dense black sheath, thickly dotted with the fruit bodies of the fungus, which is described as a new species, *Cucurbitaria piceæ* n. sp.

Frost canker of Picea sitchensis, A. W. BORTHWICK (*Notes Roy. Bot. Gard. Edinb., 1909, No. 20, pp. 263-265, pl. 1*).—The Menzies or Sitka spruce, which is extensively grown in parts of England on account of its value as timber, is dying in large quantities from a form of canker, young trees being the worst sufferers.

The first symptom of the attack is a change in the foliage from dark green to pale yellow. Next the leader loses its leaves, turns dark red in color, and its buds or branches are arrested in growth. The needles are retained on the older parts and if the trees are not killed outright an attempt is made to replace the leader by a side branch. The stem in many cases was found to be cankered. The canker at first is a small flattened area from which exudes a thin, bluish white resin. Later the bark splits, exposing the wood, and the tree attempts to cover this by a callus formation. Fructifications of an ascomycete are invariably present and may be the cause of the disease, but an anatomical examination of the tissues leaves little doubt that frost is the primary cause. A severe frost of 10 to 15° occurring in May is supposed to have caused the injury.

Other conifers have also been attacked in a similar manner.

Peziza willkommii on larches, A. W. BORTHWICK (*Notes Roy. Bot. Gard. Edinb., 1909, No. 21, pp. 23-26, pl. 1*).—This is a discussion of efforts to find exotic species of larch that are resistant to the European larch canker

(*P. willkommii*). Two species were tried, Japanese larch (*Larix leptolepis*) and a western larch (*L. occidentalis*), but neither proved to be immune from the attacks of the fungus.

Protection against fungus diseases, A. C. FORBES (*Dept. Agr. and Tech. Instr. Ireland Jour., 10 (1909), No. 1, pp. 35–42, pls. 10*).—This paper is one of a series on the protection of forests and woodlands and is devoted to accounts of fungi which attack the bark, stem, and roots of forest trees. The principal species described are *Nectria ditissima* and *N. cinnabarina* on deciduous trees, *Peziza willkommii* on larch, and *Peridermium pini* on pines.

The control of root parasites of plants, G. BELLAIR (*Rev. Hort.* [*Paris*], *81 (1909), No. 23, pp. 555, 556, figs. 2*).—Directions are given for the sterilization of the soil as a means for the control of nematodes and various fungi which attack the roots of plants. The methods of sterilization described are those applicable to field treatment and consist in injecting formalin or carbon bisulphid into the soil. The treatments should be made early in the autumn or late in the winter and should be repeated in 2 or 3 weeks. In addition to the use of the chemicals it is recommended that other crops should occupy the ground for some time, in order to prevent the possibility of the development of the nematodes or the fungi.

Fungicides and insecticides, A. E. VAN HALL-DE JONGE (*Dept. Landb. Suriname Bul. 22, pp. 1–11*).—The author gives formulas and directions for application of a number of the more common fungicides and insecticides, among them being Bordeaux mixture, petroleum emulsion, Paris green, lead arsenate, etc.

Bordeaux-sugar mixtures, A. KÖLLIKER (*Ztschr. Pflanzenkrank., 19 (1909), No. 7, pp. 385, 386*).—The author discusses the value and chemical composition of Bordeaux-sugar mixtures. The claim is made that when small quantities of sugar or molasses are added to the usual Bordeaux mixture, its keeping qualities are increased, it stays on the plants longer, and the sugar combines with the Bordeaux forming new salts which, when sprayed on the leaves and exposed to the action of the air, rapidly decompose and liberate the copper. It was found that the salts formed in the Bordeaux-sugar mixtures were double salts of complex structure.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

How to destroy English sparrows, N. DEARBORN (*U. S. Dept. Agr., Farmers' Bul. 383, pp. 11, figs. 4*).—The English sparrow, introduced about 60 years ago, is now generally distributed over the eastern half of the United States and southern Canada and locally westward to the Pacific Coast. A few approved methods for abating the nuisance, applicable to different conditions, are here described. The most effective method of preventing the increase of sparrows in a locality is considered to be to destroy their nests at intervals of 10 or 12 days throughout the breeding season.

Methods of destruction are discussed under the headings of baiting, trapping, shooting, and poisoning. Where the use of poison is not prohibited by law it may be effectively used to reduce the number of sparrows. Of the different poisons tested, the most satisfactory is strychnia sulphate, since it is easily prepared and acts quickly. "A poison mixture that has proved very effective is prepared as follows: Put $\frac{1}{8}$ oz. of strychnia sulphate into $\frac{3}{4}$ gill of hot water and boil until dissolved. Moisten $1\frac{1}{2}$ teaspoonfuls of starch with a few drops of cold water, add it to the poison solution, and heat till the starch thickens. Pour the hot poisoned starch solution over 1 qt. of wheat and stir until every kernel is coated." Although 2 kernels of wheat coated with the solution have been known to kill a sparrow, 6 or 7 kernels are required to insure fatal results.

If undisturbed, poisoned sparrows will usually be found within a few feet of where the bait was spread, death occurring in from 3 to 20 minutes.

It is pointed out that sparrows, when trapped or shot, may be utilized for food, as the flesh is palatable and nutritious.

List of birds found in West Virginia, E. A. Brooks (*Rpt. W. Va. Bd. Agr., 1908, No. 12, pp. 65, pls. 4*).—A list of about 250 species known to occur within the State is given, with a brief account of their geographical distribution, nests, and food.

A list of birds collected by Dr. Paul Bartsch in the Philippine Islands, Borneo, Guam, and Midway Island, with descriptions of three new forms, E. A. Mearns (*Proc. U. S. Nat. Mus., 36 (1909), pp. 463–478*).—The birds here listed were collected during the voyage of the U. S. Bureau of Fisheries steamer Albatross to the Philippine Islands. Three forms are described as new to science.

Additions to the list of Philippine birds, with descriptions of new and rare species, E. A. Mearns (*Proc. U. S. Nat. Mus., 36 (1909), pp. 435–447*).—This is the seventh of a series of papers on Philippine birds published by the author, adding in all 56 species to the list of those previously known from the islands.

Philippine ornithological literature, II, R. C. McGregor (*Philippine Jour. Sci., A. Gen. Sci., 4 (1909), No. 1, pp. 79–86*).—An annotated list of 50 titles in continuation of a bibliography previously noted (E. S. R., 20, p. 1145).

A collection of birds from northern Mindanao, R. C. McGregor (*Philippine Jour. Sci., A. Gen. Sci., 4 (1909), No. 1, pp. 67–77*).—A report of collections made by A. Celestino during October, November, and December, 1907. While most of the species are of wide distribution or already known from Mindanao, 6 are recorded from the island for the first time.

Egyptian birds, C. Whymper (*London, 1909, pp. X+221, pls. 51, figs. 11*).—A popular illustrated account of the birds of Egypt.

A small contribution to the knowledge of trematodes of birds, L. A. Jägerskiöld (*Centbl. Bakt. [etc.], 1. Abt., Orig., 48 (1908), No. 3, pp. 302–307, figs. 7*).—One genus (Spelophallus) and 3 species are described as new to science.

Relation of insects to human welfare, H. A. Gossard (*Jour. Econ. Ent., 2 (1909), No. 5, pp. 313–324*).—A general account is given.

Insects and legislation, E. P. Felt (*Jour. Econ. Ent., 2 (1909), No. 5, pp. 342–345*).—A brief review of the subject.

Medical entomology, its scope and methods, W. B. Herms (*Jour. Econ. Ent., 2 (1909), No. 4, pp. 265–268*).—A paper presented at the Pacific Coast Entomological Conference at Berkeley, Cal., in April, 1909.

[The common names of insects adopted by the American Association of Economic Entomologists], A. F. Burgess (*Amer. Assoc. Econ. Ent. Circ. 1, pp. 6*).—This is a list of 231 common names adopted previous to 1909.

A list of works on North American entomology, N. Banks (*U. S. Dept. Agr., Bur. Ent. Bul. 81, pp. 120*).—This is a revision of Bulletin 24 of the Bureau of Entomology (E. S. R., 12, p. 774), and also includes additional works that have been published since the issuance of that bulletin in 1900.

The thorax of insects and the articulation of the wings, R. E. Snodgrass (*Proc. U. S. Nat. Mus., 36 (1909), pp. 511–595, pls. 30, figs. 6*).—This paper is an attempt to show the unity of thoracic structure that prevails throughout all the orders of insects.

A new apparatus for experimenting on the sucking of insects, G. Zirolia (*Centbl. Bakt. [etc.], 1. Abt., Orig., 48 (1908), No. 2, pp. 173–175, fig. 1*).—This is an illustrated account of an apparatus for use in the application of insects for the observation of the blood sucking process.

A new insectary, E. D. SANDERSON (*New Hampshire Sta. Sci. Contrib. 3, pp. 389, 390, pl. 1; Jour. Econ. Ent., 2 (1909), No. 6, pp. 389, 390, pl. 1*).—A novel insectary erected at the New Hampshire Station during the summer of 1909 is described and illustrated. The object in its erection was to furnish more natural conditions for life history work than could be obtained in a glass house. The insectary is 13 by 24 ft., with a permanent wooden workshop, 6 by 13 ft., at one end. The roof is of double canvas and the sides of the rearing room of 18-mesh bronze screening. It is erected in such a way that it can be taken down and stored during the winter. The insectary is stated to have been erected at a cost of approximately $400.

The life zones of Indiana as illustrated by the distribution of Orthoptera and Coleoptera within the State, W. S. BLATCHLEY (*Proc. Ind. Acad. Sci., 1908, pp. 185–191*).—This account is based upon collections made of insects of Indiana during a period of 20 years. About 150 species of Orthoptera and some 2,700 species of Coleoptera have been collected.

"The facts brought out regarding the distribution of Orthoptera and Coleoptera in Indiana, which are supplemented by numerous field notes on other groups of insect and animal life, and on the flowering plants, prove conclusively that the 'transition zone,' represented by the Alleghanian fauna and flora, overlaps the northern fourth of the State, while the 'lower austral zone,' represented by the Austroriparian fauna and flora, overlaps the greater part of the southern third. The Carolinian fauna and flora of the Upper Austral embraces, of course, the prevailing forms of life in the State, 93 of the 148 species of Orthoptera belonging to it. The majority of these range over the entire State, mingling with the representatives of the Alleghanian fauna in the north and with those of the Austroriparian fauna in the southern third. The proportion of Coleoptera belonging to the Carolinian fauna will be about the same, but the exact figures can not as yet be given. To the Carolinian fauna belong also the great majority of the other forms of animal life in the State."

Dragonflies of the Mississippi Valley collected during the pearl mussel investigations on the Mississippi River, July and August, 1907, C. B. WILSON (*Proc. U. S. Nat. Mus., 36 (1909), pp. 653–671*).—A list is here presented of the different species obtained in connection with the pearl mussel investigations on the Mississippi River and its tributaries during the summer of 1907, with their geographic and seasonal distribution.

On Brazilian grasshoppers of the subfamilies Pyrgomorphinæ and Locustinæ, J. A. G. REHN (*Proc. U. S. Nat. Mus., 36 (1909), pp. 109–163, figs. 39*).—Fifty-three species are treated in this paper, of which 17 are new. Four new genera are also described.

A contribution to the knowledge of the Orthoptera of Sumatra, J. A. G. REHN (*Bul. Amer. Mus. Nat. Hist., 36 (1909), pp. 177–211, figs. 31*).—Eighty species are considered in this paper. Three genera and 17 species are described as new to science.

New genera and species of Illinois Thysanoptera, J. D. HOOD (*Bul. Ill. State Lab. Nat. Hist., 8 (1908), Art. 2, pp. 361–378, figs. 9*).—Five genera (Heterothrips, Lissothrips, Plectrothrips, Neothrips, Allothrips) and 15 species from Illinois are described as new to science.

Life history of Corizus lateralis, J. C. HAMBLETON (*Ann. Ent. Soc. Amer., 2 (1909), No. 4, pp. 272–276, pl. 1*).—This species is said to have been very abundant in the neighborhood of Columbus, Ohio, during the summer of 1909. *Polygonum pennsylvanicum*, its host plant, is a native annual that is quite generally distributed over the whole United States. It is said that adults were also taken on *P. persicaria*, a species introduced from Europe, and widely distributed,

but that neither eggs nor young were found upon it. Technical descriptions are given of the egg and 5 instars.

Two new genera and species of Aphididæ, J. J. Davis (*Ann. Ent. Soc. Amer., 2 (1909), No. 3, pp. 196–200, pl. 1*).—*Phymalosiphum monelli*, collected in May and June from Ohio buckeye (*Æsculus glabra*), at St. Louis, Mo., and *Idiopterus nephrelepidis*, taken from ferns in a greenhouse at Western Springs, Ill., in December, are the genera and species described as new. The latter species was also found to be injuring sword fern in a Chicago greenhouse.

Plant louse notes, family Aphididæ, C. P. Gillette (*Jour. Econ. Ent., 2 (1909), No. 5, pp. 351–358, pl. 1*).—Brief notes are first given on Fitch's types, which were examined by the author. Attention is called to the fact that Fitch considered all winged aphids to be males. Field notes presented relate to 24 species.

Some new records of Aphididæ in North America, H. F. Wilson (*Jour. Econ. Ent., 2 (1909), No. 5, pp. 346–350, figs. 2*).—A new aphis enemy of bananas (*Pentalonia nigronervosa*), which had been found very abundant on banana plants in the greenhouses of this Department and is supposed to have been imported on banana plants, is redescribed.

Aphis angelicæ, which in Europe feeds on *Angelica sylvestris*, has been found to infest a species of Angelica and ivy in California. *Drepanosiphum platanoides* is reported from North America for the first time, having been taken on a maple at Lorenzo, Cal.

Notes on Aphididæ collected in the vicinity of Stanford University, W. M. Davidson (*Jour. Econ. Ent., 2 (1909), No. 4, pp. 299–305*).—Of the many species here noted, 5 are described as new to science and 2 or 3 European forms are reported from America for the first time.

Aphididæ or plant lice, E. P. Felt (*Jour. Econ. Ent., 2 (1909), No. 4, pp. 306, 307*).—Notes on numerous species unusually abundant or destructive in the State of New York in 1909 are presented.

Experimental transmission of exanthematous typhus by the body louse, C. Nicolle, C. Comte, and E. Conseil (*Compt. Rend. Acad. Sci. [Paris], 149 (1909), No. 10, pp. 486–489, figs. 2*).—The authors, working in Tunis, succeeded in transmitting typhus fever from an infected macacus monkey (*Macacus sinicus*) to a healthy one by means of the body louse (*Pediculus vestimenti*).

The typhus fever of Mexico, H. T. Ricketts and R. M. Wilder (*Jour. Amer. Med. Assoc., 54 (1910), No. 6, pp. 463–467*).—In regard to the transmission of this disease the authors state that of the 3 insects which are most open to suspicion, namely, the body louse, the bedbug, and the flea, only the first named would seem to merit serious consideration because of the epidemiology of the disease. Experiments with this louse (*Pediculus vestimenti*) are now under way.

The authors were able to confirm the probable susceptibility of the monkey to inoculations with the blood of patients suffering from the typhus fever of Mexico, as reported by Anderson and Goldberger in a publication previously noted (E. S. R., 22, p. 284). Filtration experiments indicate that the virus of typhus fever of Mexico may be classed with the unfilterable viruses.

The pine-leaf and the green-winged Chermes, Edith M. Patch (*Maine Sta. Bul. 171, pp. 200–204, figs. 3*).—A brief account is given of the pine-leaf Chermes (*C. pinifoliæ*), which, during the summer of 1909, badly infested pines in the vicinity of Orono. Spraying with whale-oil soap (1 lb. to 2 gal. of water) will doubtless destroy the young on the white pine shoots, but it is considered doubtful whether this would be worth while in Maine where syrphus flies are abundant.

The galls formed by the green-winged Chermes (*C. abietis*) are reported to have been very abundant on Norway spruce on the university campus and very troublesome on native spruce, 990 galls formed during the season having been counted August 1 on a single white spruce 3 ft. tall. Attention is called to the fact that while *C. pinifoliæ* has alternate host plants (pine and white and black spruce) *C. abietis* does not. It is believed that the practice of removing and burning galls will serve to control *C. abietis* sufficiently on ornamental trees.

The San José scale and osage orange hedge, T. B. SYMONS and L. M. PEAIRS (*Maryland Sta. Bul. 140, pp. 87–101*).—Tests made during the year of several commercial sprays, to the use of which many growers are resorting because of the labor problem, are reported and discussed. On peach trees, the authors report that "several solutions, namely, orchard brand lime sulphur, Rex lime sulphur, soluble oil, Swift lime sulphur at 1 lb. per gallon, and Bogart's sulphur compound at 1:15, gave uniformly excellent results. Others, scalecide 1:15, Niagara brand lime sulphur, and Never-scale at 50 lbs. to 50 gal. were not far behind in efficiency. Weaker strengths of some of these mixtures, as well as Cooper V[1] and target brand, did not prove satisfactory. San-u-zay, while fairly satisfactory for the fall spraying and effective against the scale in the spring, caused very serious injury to the tops of those trees to which it was applied in March."

Tests on apples were made in November, 1908, and March, 1909, with orchard brand lime sulphur solution 1:9 and 1:10, orchard brand soluble oil (in November only), Rex lime sulphur solution 1:10, and homemade lime sulphur wash. "Careful observations failed to reveal any marked difference in effect of the various mixtures or dates of spraying on the scale, as the results were all very good. However, some of the badly infested trees that were sprayed in the spring died, while equally infested trees sprayed in the fall survived, indicating that for very badly infested orchards, the best practice is to spray as soon as possible in the fall, and perhaps give a second treatment in the spring."

Both apple and peach trees were sprayed with orchard brand lime sulphur, soluble oil, scalecide, San-u-zay, and Rex lime sulphur in fall and spring. No difference in the amount of scale killed was noted, but in case of the San-u-zay oil, peach trees sprayed in November were not injured by the oil, while those sprayed in March were quite seriously injured. The authors consider the tests to indicate that the concentrated lime sulphur solution should not be used weaker than 1 gal. of the solution to 9 of water, while in case of bad infestation a greater strength may be used. Practically no difference could be detected in the decidedly beneficial effect of homemade and concentrated lime sulphur solutions on the leaf curl of peach trees. The authors continue to believe that the lime sulphur solutions offer the safest and most generally satisfactory remedy for the San José scale.

The osage orange hedge is said to be one of the greatest factors in the perpetuation of the San José scale in Maryland at this time. Hedges abound in many parts of the State, in some instances being practically the only fences. Thus far not one has been found to be free from scale, and through the visits of birds, they are a prolific source of infestation to fruit trees a considerable distance away. The Maryland horticultural law, however, requires that all infestations of San José scale be either treated or destroyed, so that if such hedges are maintained they must be sprayed annually. The Japanese quince and hawthorn, occasionally used in hedges, are also food plants of the San José scale, but the California privet, another hedge plant, is seldom attacked.

The bulletin closes with a brief account of the work of the 23 public spraying outfits operated during the spring of 1909.

Papers on Coccidæ or scale insects. Catalogue of recently described Coccidæ, II, J. G. SANDERS (*U. S. Dept. Agr., Bur. Ent. Bul. 16, pt. 3, tech. ser., pp. 33–60*).—In this catalogue, the second of the series (E. S. R., 18, p. 59), are included references to 24 new genera, 195 new species, and 14 new varieties. The list is thought to be quite complete up to March, 1909.

A preliminary list of the Coccidæ of Wisconsin, H. C. and H. H. P. SEVERIN (*Jour. Econ. Ent., 2 (1909), No. 4, pp. 296–298*).—Thirty-eight species, exclusive of Eulecanium, are listed from Wisconsin.

California horticultural quarantine, C. W. WOODWORTH (*Jour. Econ. Ent., 2 (1909), No. 5, pp. 359, 360*).—A list is given of 11 species of Coccidæ that are established in California.

Mimicry in the butterflies of North America, E. B. POULTON (*Ann. Ent. Soc. Amer., 2 (1909), No. 4, pp. 203–242*).—An address delivered to the Entomological Society of America, at Baltimore, in December, 1908.

Some insects injurious to truck crops. The Lima-bean pod-borer. The yellow-necked flea-beetle, F. H. CHITTENDEN (*U. S. Dept. Agr., Bur. Ent. Bul. 82, pt. 3, pp. 25–32, fig. 1*).—The Lima-bean pod-borer (*Etiella zinckenella*) is reported to have been collected at Rattlesnake Bridge in Eldorado County, and at Anaheim, Santa Ana, Garden Grove, Compton, and Watts, Cal., infesting lima-bean pods. The larvæ attack the bean along the edge and usually devour the germ, consuming the entire bean if young and tender. They are quite capable of entering other pods by cutting a small hole in the side. Like the pea moth, this species appears to be an inhabitant of the Eastern Hemisphere and has been introduced, perhaps, from both Europe and Asia. North Carolina is the northernmost locality recorded, but it may be present farther north in the Atlantic region. Evidently the species is cosmopolitan but may not occur far northward. An ichneumon fly has been reared from the pest.

The yellow-necked flea-beetle (*Disonycha mellicollis*) is reported to have been particularly injurious to truck crops in Texas and Florida in 1909, spinach and beets in particular having been injured. The pests have also been collected from portulaca, chickweed, amaranthus, and lettuce. It is known to occur in New York, Maryland, Virginia, District of Columbia, North Carolina, and Ohio, as well as in Louisiana, Texas, and Colorado. In a report by H. O. Marsh, incorporated in the account, information is given on the occurrence and habits of the pest as observed in the vicinity of Brownsville, Tex. Eggs deposited May 12 hatched in 4 days. Eleven days were passed in the larval and 5 days in the pupal stages. Applications of Paris green or lead arsenate will control the pest. Its natural food plants, especially purslane and chickweed, should be kept down and sprayed when treating the affected crops.

The oblique-banded leafroller, E. D. SANDERSON and ALMA D. JACKSON (*New Hampshire Sta. Sci. Contrib. 3, pp. 391–403, pls. 4; Jour. Econ. Ent., 2 (1909), No. 6, pp. 391–403, pls. 4*).—Attention was called, in July, 1909, to a very severe injury by the oblique-banded leafroller (*Archips rosaceana*) in a large rose house at Madbury, N. H. On 1 or 2 benches in this house the roses had been entirely defoliated for over 200 ft., the injury causing a loss of about $5,000.

It was found that where plants are badly infested the larvæ tie the terminal leaves together in a typical tortricid fashion, thus checking all growth of the plant, and burrow into the flower buds, so that there is no possibility of securing blooms. The insect appears to have been introduced into the house on plants from an Ohio firm. While it is a common species occurring from Maine to California, comparatively little has been known of its life history and habits. A list is given of 50 species known to serve as food plants. It has been reported as a source of injury to apples in New York, to pears in Ontario, to prunes in Washington, and to roses in Pennsylvania and Massachusetts.

Life history observations here reported were made during August and early September, 1909. The eggs are laid in round or oval, flat, green patches, each containing an average of about 117 eggs. As many as 650 eggs were deposited by a single moth, the average of 305 eggs to a moth being recorded. Eggs kept in an incubator at a mean temperature of 80° F. hatched in 6.67 days, while a lot kept at a mean temperature of 70° required 10.18 days. "The larvæ when first hatched are extremely minute and closely resemble the leaf in color. They crawl about for 3 or 4 days feeding here and there and growing rapidly. At the end of this period the young larva begins to form a protection for itself by pulling 2 or 3 leaves together, or more frequently a young larva will fold over a single leaf forming a tube open at either end. The leaves are held together by silken threads. The larva feeds upon the inside of the tube or makes short excursions to adjacent leaves which are pulled down and attached to the original tube, so that as the larva increases in size it also increases the size of the nest." Before pupating the larva draws the leaves together more firmly than usual so that they practically form a cocoon, to the silk of which the pupa is attached by the hooks of the cremaster. At a temperature of 80° the average length of the larval stage was 32.69 days, and the pupal stage varies from 5 to 8 days, with an average of 6.41 days. Out of 62 pupæ, 35 were males and 27 females. About 30 per cent of the pupæ failed to transform. The adults emerge during the night and if not disturbed will remain in the vicinity of the pupal cases throughout the following day. At a temperature of 70° moths were found to commence oviposition in from 1 to 6 days, or on the average in 3.45 days. Egg deposition may not, however, all occur at once, as one moth may deposit several egg masses at different times. The life of the moth when kept at 70° is shown to be from 11 to 20 days, or on the average 14.6 days. Technical descriptions are given of the several stages.

Parasites are said to be the most effective means of holding the pest in check. "The outbreak observed by us furnished a case of the most complete parasitism we have ever seen. When first observed in late July from one-third to one-half of the eggs were parasitized by a species of Trichogramma. Two weeks later it was difficult to find an egg mass in which over 95 per cent of the eggs did not contain the black pupæ of the parasite and in most cases 99 to 100 per cent were affected."

In experiments with hydrocyanic-acid gas it was found necessary to increase the strength to 1 oz. for 150 cu. ft. of space in order to kill even a minority of the larvæ and moths, but this strength seriously injured the plants. Results from spraying with arsenate of lead 3 lbs. to the barrel were obscured by the almost total parasitism of the eggs. It is thought that reasonable diligence in hand picking will control the pest. Large numbers of moths were caught by trap lanterns set in pans of water which were placed throughout the houses.

A complete bibliography is appended to the account.

Report of the superintendent of gipsy and brown-tail moth work, A. E. Stene (*Ann. Rpt. Bd. Agr. R. I., 24* (*1908*), *pp. 31–46, pls. 6*).—A report of the work carried on in Rhode Island, which is stated to have resulted in a steady decrease during the past 3 years in the number of insects throughout the entire infested territory.

The spruce budworm, A. Gibson (*Canad. Forestry Jour., 5* (*1909*), *No. 4, pp. 143, 144*).—*Tortrix fumiferana* is reported to have been a source of considerable injury to spruce and balsam trees in the Upper Gatineau country of the province of Quebec, and also to have been found working in British Columbia.

The infested area in Ontario was examined late in July by the author, who found that the caterpillars had evidently become full grown during the first and

second week of July. The caterpillars had fed chiefly at the tops of the trees, although some injury had been done toward the ends of many of the lower branches. The foliage for about 4 or 5 ft. from the tops of infested trees had been almost entirely destroyed.

Additional rearings in Cecidomyiidæ, E. P. FELT (*Jour. Econ. Ent.*, *2* (*1909*), *No. 4*, *pp. 286–293*).—Brief characterizations are given of 37 new species reared and of the galls from which they were obtained.

Transmission of malarial fever in the Canal Zone by Anopheles mosquitoes, S. T. DARLING (*Jour. Amer. Med. Assoc.*, *53* (*1909*), *No. 25*, *pp. 2051–2053*).—The habits of Anopheles mosquitoes and their relations to malaria are discussed. Attention is called to the fact that certain species are natural transmitters of malarial fever while others are rarely, if ever, found infected naturally, although it is possible to infect them under laboratory conditions. It is said that there is as much selection of breeding places by Anopheles as there is selection of feeding grounds by fish.

"Eleven species of anophelines have been collected in the Canal Zone. Of these 11 species the 3 commonest ones are *Anopheles albimanus*, *A. pseudopunctipennis*, and *A. malefactor*. *A. albimanus* is much the commonest Anopheles in the Canal Zone and is the one oftenest taken in quarters and barracks, although the proportion of one species to another varies somewhat with the season and locality. . . . Tree-breeding species are rarely encountered and I know of no instance in which specimens of this species have been taken in quarters. . . .

"A series of bitings were conducted on suitable infected patients who were carrying estivoautumnal or tertian gametes in their peripheral blood, using 4 varieties of mosquitoes. Out of several hundred mosquitoes used in the biting experiments, 100 mosquitoes were dissected, and of these 70.8 per cent of *A. albimanus* became infected; 12.9 per cent of *A. pseudopunctipennis* became infected, and none of *A. malefactor* (17 mosquitoes used) became infected, although several of the latter were purposely placed in jars with *A. albimanus* and bit at the same time persons from whom the specimens of *A. albimanus* became infected." Specimens of *A. albimanus* infected with tertian parasites became infective between 9 and 11½ days after the first feeding.

As a result of numerous biting experiments, weighings, and examinations of blood from the host and from the midgut of the mosquitoes following its ingestion, the author concludes "that a patient with more than one crescent for every 500 leucocytes, or 12 crescents per cubic millimeter, is infective and it follows that such an individual should not be discharged from treatment in that condition or should be warned or required to continue treatment. Such a person is a gamete-carrier and is a menace to a malarial community whenever susceptible Anopheles have access to him."

It has been found that *A. albimanus* is the host for estivoautumnal and tertian malarial parasites in the Canal Zone at the present time, and that *A. tarsimaculata* transmits estivoautumnal parasites. *A. malefactor* does not transmit malarial fever, while *A. pseudopunctipennis* is only slightly concerned in its transmission. In the efforts at mosquito destruction, the extermination of *A. albimanus* is considered of paramount importance.

Mosquito or man? The conquest of the tropical world, R. BOYCE (*London*, *1909*, *pp. XVI+267*, *figs. 44*; *rev. in Nature* [*London*], *82* (*1909*), *No. 2093*, *pp. 158–160*, *figs. 2*).—An historical account of the application of prophylactic measures in combating tropical diseases.

Flies and mosquitoes (*Country Gent.*, *74* (*1909*), *Nos. 2955*, *p. 883*; *2959*, *p. 975*; *2960*, *p. 999*; *2961*, *p. 1023*).—A popular account of these insects in their relation to disease transmission, with methods of control,

Glossina palpalis as a carrier of Trypanosoma vivax in Uganda, D. Bruce et al. (*Proc. Roy. Soc. [London], Ser. B, 82 (1909), No. B 552, pp. 63–66*).—"The *G. palpalis* on the shores of Victoria Nyanza are infected, not only by *T. gambiense*, but also by *T. vivax*. What the reservoir of the virus of *T. vivax* is, is unknown, but the buffalo, waterbuck, and other antelope which live on the lake shore should be examined."

Progress report on the Uganda Sleeping Sickness Camps from December, 1906, to November 30, 1908, A. D. P. Hodges (*Rpt. Uganda Sleeping Sickness Camps, 1906–1908, pp. 44*).—In an appendix to the report, a brief account is given of the breeding grounds of *Glossina palpalis*, by A. D. Fraser and C. H. Marshall (pp. 40–44).

Injurious June beetles (Anomala marginata), J. C. Stiles (*Jour. Econ. Ent., 2 (1909), No. 5, pp. 362, 363*).—Through partial defoliation, *A. marginata* is said to have seriously injured a large apple orchard in Patrick County, Va., in July, 1909. Grapevines near by were entirely defoliated.

A new treatment for wireworms, H. T. Fernald (*Jour. Econ. Ent., 2 (1909), No. 4, pp. 279, 280*).—The treatment here proposed is based upon a series of tests extending through 2 seasons. After tarring, seed corn is placed in a bucket containing fine dust and Paris green mixed in such proportions that the corn, after being shaken up in the bucket, shows a greenish color. When thus applied it appears to act as a repellent. It is considered probable that Paris green is present in sufficient quantity to prove a fatal dose for crows attacking corn.

Eleodes as an enemy of planted grain, M. H. Swenk (*Jour. Econ. Ent., 2 (1909), No. 5, pp. 332–336, pls. 2*).—This is a detailed account of the injury in Nebraska by the larvæ of a tenebrionid (*Eleodes opaca*), of which a brief account has been previously noted (E. S. R., 22, p. 57).

On September 29, when the author visited Beaver City, Furnas County, Nebr., the larvæ were found to be abundant in every part of a grain field examined, about 60 per cent of the planted seed being so gnawed that it could never germinate. This condition seemed to be general in all fields over the whole region, extending at least over the southern half of the county. It was necessary with 1 field of 90 acres in winter wheat to completely resow 40 acres. The larvæ were also present in corn fields, and in breeding cages they ate corn kernels greedily. Mention is made of the occurrence in Nebraska of several other species of Eleodes. In 1909, *Embaphion muricatum* occurred in infested fields in company with the swarms of *E. opaca*.

The Scolytidæ of Hokkaido: Their relation to forest injury, Y. Niisima (*Jour. Col. Agr. Tohoku Imp. Univ., 3 (1909), No. 2, pp. 109–179, pls. 7, figs. 9*).—In this account of the bark beetles of the Japanese Island of Hokkaido, 64 species are recorded of which 16 are described as new to science. Generic tables are given for the separation of many of the species, and a host plant list of the beetles is appended.

[Cave beetles], R. Jeannel (*Arch. Zool. Expt. et Gén., 5. ser., 1 (1909), pp. 447–532, pls. 8; abs. in Jour. Roy. Micros. Soc. [London], 1909, No. 6, pp. 716, 717*).—A report on cave beetles found by the author in France and Algeria. Sixty-one species are recorded from 54 French caves and 26 species from Algerian caves. A bibliography of 34 titles is appended.

A parasite on the asparagus beetle, H. T. Fernald (*Jour. Econ. Ent., 2 (1909), No. 4, pp. 278, 279*).—The species of Tetrastichus described in the article abstracted below was observed by the author at Amherst, Mass., in June ovipositing in the eggs of the asparagus beetle. This parasite was also observed at Concord, Mass.

Two new species of the genus Tetrastichus, J. C. CRAWFORD (*Proc. Ent. Soc. Wash., 11 (1909), No. 3, p. 150*).—*Tetrastichus asparagi* reared from eggs of the asparagus beetle at Amherst, Mass., and *T. hunteri* reared from the larva of the boll weevil at Natchez, Miss., are described as new to science.

The biology and morphology of one of the parasites (Apanteles glomeratus) of the cabbage butterfly, R. WEISSENBERG (*Sitzber. Gesell. Naturf. Freunde Berlin, 1908, No. 1, pp. 1–18, figs. 9*).—This parasite of *Pieris brassicæ* is said to be unusually common in the vicinity of Berlin.

A synopsis of the American species of Scolioneurinæ, A. D. MACGILLIVRAY (*Ann. Ent. Soc. Amer., 2 (1909), No. 4, pp. 259–271*).—Two genera and 4 species of sawflies are described as new to science.

Observations on the biology of ticks, B. GALLI-VALERIO (*Centbl. Bakt.* [etc.], *1. Abt., Orig., 47 (1908), No. 5, pp. 611, 612, fig. 1*).—Notes on the biology of *Ixodes hexagonus* and *I. ricinus.*

Notes on mites affecting chickens, G. W. HERRICK (*Jour. Econ. Ent., 2 (1909), No. 5, pp. 341, 342*).—Young chickens in the poultry yards at Agricultural College, Miss., are reported to have been affected during the summers of 1908 and 1909, by Trombidium larvæ. The mites were found nearly buried in nodules which had been formed about them. Affected chicks seem to contract a diarrhea, grow weaker and weaker, and finally die. The mites are believed to be responsible for a high mortality among chickens in the South.

Ticks and other blood-sucking arthropoda [in Jamaica], R. NEWSTEAD (*Ann. Trop. Med. and Par., 3 (1909), No. 4, pp. 421–469, pls. 4, figs. 2*).—This account is based upon investigations conducted in Jamaica from the end of November, 1908, to the end of January, 1909. The greater part of the report is given up to the ticks which by their vast numbers have rendered nearly all the grazing districts of the island unendurable to man and a veritable plague to domesticated animals.

The author first discusses the seasonal prevalence of ticks, effect of rain and water on ticks and their eggs, dissemination of cattle ticks by various agencies, prevailing conditions under which pastures are either most free or most infested with ticks, longevity of ticks without access to a host, and the life cycle and structural characters of ticks, and presents an artificial key to the Jamaica ticks.

Eight species of ticks which occur in Jamaica are considered of which all but the fowl tick (*Argas persicus miniatus*) were found by the author. The cattle tick (*Margaropus annulatus australis*) is by far the most abundant in the island, 90 to 95 per cent of those found being of this species. *Rhipicephalus sanguineus* is said to be a source of great annoyance to dogs. The tropical horse tick (*Dermacentor nitens*) is reported to be fairly widely distributed over the island. *Amblyomma cajennense*, which, next to the cattle tick, is the most abundant species in Jamaica, is generally distributed in all localities where domestic animals are kept and is a great pest to man. *A. maculatum* was collected in the Mandeville district of Manchester. *A. dissimile* was collected from the so-called bull frog (*Bufo marinus*), and a single specimen of a species of Aponomma was taken from a lizard (*Anolis* sp.) Attention is called to the fact that Mysore cattle are almost totally immune to the attack of ticks and that the ticks show a preference for cattle which have little or no Indian or Spanish strain in their blood.

The natural enemies of ticks mentioned as occurring in Jamaica are the Savanah blackbird (*Quiscalus crassirostris*), the food of which consists chiefly of insects and ticks, the Savanah or parrot-billed blackbird (*Crotophaga ani*), the domestic fowl, lizards, and the bull frog (*Bufo marinus*). Remedial

measures, including burning over pastures, cattle washes, and dips, are also discussed.

The screw worm fly (*Chrysomyia macellaria*) is said to be a common species, and mention is made of a case in which 3 immature larvæ were removed from a man's ear. Other important pests noted are *Lyperosia irritans*, the stable fly, *Chrysops costalis*, a new blood-sucking tabanid (*Atylotus jamaicensis* n. sp.), a hippoboscid parasitic on birds (*Ornithoctona erythrocephala*), also one on bats (*Trichobius parasiticus*), the chiggoe flea (*Dermatophilus* [*Sarcopsylla*] *penetrans*), and *Anthrax lucifer.*

Thirty-ninth annual report of the Entomological Society of Ontario (*Ann. Rpt. Ent. Soc. Ontario, 39 (1908), pp. 152, pls. 19, figs. 41*).—In this report of the society numerous papers are included, among which are the following: Reports on Insects of the Year, by C. E. Grant, J. B. Williams, C. W. Nash, and P. Hahn (pp. 10–14); The Interpretation of Nature, by E. P. Felt (pp. 23–30); a report of Entomology in the Graduate School of Agriculture, held at Cornell University, July, 1908, by W. Lochhead (pp. 31, 32); The Economic Importance and Food Habits of American Gall Midges, by E. P. Felt (pp. 43–46); Observations on the Sorghum Midge, by R. C. Treherne (pp. 47–49); *Hydrœcia micacea*, especially in Canada, by A. Gibson (pp. 49–51); Further Notes on the Coccidæ of Ontario, by T. D. Jarvis (pp. 52–54); Some Enemies of Ontario Coccidæ, by J. W. Eastham (pp. 54–56); Some Beetle Haunts, by F. J. A. Morris (pp. 56–63); Notes on the Occurrence of Lachnosternas in 1908, by J. D. Evans (p. 66); Apparatus for Collecting Small Arthropods Terrestrial and Aquatic, by T. D. Jarvis (pp 66–69); A Catalogue of the Gall Insects of Ontario, with numerous illustrations and a bibliography, by T. D. Jarvis (pp. 70–98); Entomological Record, 1908, by J. Fletcher and A. Gibson (pp. 99–116); Insects of the Year 1908 at Ottawa, by A. Gibson (pp. 116–120); an account of the Present Condition of the Work Connected with the Importation of the Foreign Parasites of the Gipsy and Brown-tail Moths, by L. O. Howard (pp. 121–124); The Strawberry Weevil, by W. Lochhead (pp. 124, 125); Injurious Insects in Ontario in 1908, by C. J. S. Bethune (pp. 128–135); Injurious Insects of Quebec in 1908, by W. Lochhead (pp. 135–138); and Life History of *Euchætias oregonensis*, by H. H. Lyman (pp. 145–147).

Report on parasitic and injurious insects, 1907–8, W. W. FROGGATT (*Sydney, N. S. W.: Govt., 1909, pp. 115, pls. 22*).—This report consists of 3 parts.

Part 1 (pp. 1–57) is a general report on the author's trip, previously noted (E. S. R., 21, p. 648). It deals with the commercial value of introduced parasites in dealing with insect pests, the range and spread of fruit flies and the methods adopted in other countries to check them, the value of parasites in exterminating fruit flies, and the habits of cosmopolitan insect pests.

In part 2 (pp. 58–72), notes are presented on parasites and insects that have been introduced from foreign countries to check or exterminate injurious insects. In part 3 (pp. 73–115), a general account is given of the flies belonging to the family Trypetidæ that damage sound fruit, with descriptions of the different species and their habits and range, and suggestions for destroying them. Four species, *Dacus frenchi* and *D. ornatissimus* from New Caledonia, *D. curvipennis* from Fiji, and *Ceratitis striata* from Ceylon, are described as new to science.

The principal insects injurious to horticulture during 1906–7, M. H. SWENK (*Ann. Rpt. Nebr. Hort. Soc., 39 (1908), pp. 141–158, figs. 13*).—Previously noted from another source (E. S. R., 20, p. 1146).

[Some olive insects in Spain], N. GARCÍA (*Bol. Agr. Téc. y Econ., 1 (1909), Nos. 3, pp. 267–280; 5, pp. 457–466*).—The species for which biological notes

and remedial measures are here given are *Lecanium oleæ, Capnodium oleophilum, Prays oleæ, Psylla oleæ, Phlœothrips oleæ*, and *Cossus ligniperda*.

Insect work on the shade and ornamental trees in Brooklyn for 1909, J. J. LEVISON (*Jour. Econ. Ent., 2 (1909), No. 5, pp. 363, 364*).—It is reported that in 1909 23,000 lbs. of lead arsenate was used, over 40,000 trees being sprayed. The tussock moth and *Datana ministra* were the most numerous caterpillars. Other important enemies were elm-leaf beetle, scurfy and oyster-shell scales, Ailanthus and Cynthia moths and the bagworm. New pests which are becoming formidable are the linden borer (*Saperda vestita*) on the European lindens and the hickory bark borer (*Scolytus quadrispinosus*) on all species of hickories.

Report of the nursery inspector, A. E. STENE (*Ann. Rpt. Bd. Agr. R. I., 24 (1908), pp. 115–133, pls. 3*).—A brief report of the work for 1908, including accounts of the elm-leaf beetle and tussock moth.

Orchard spraying. Orchard protection work, F. SHERMAN, Jr. (*Bul. N. C. Dept. Agr., 30 (1909), No. 6, pp. 45, figs. 12*).—This bulletin gives an account of the more important items in connection with the spraying of fruit orchards, and also a description of the more important lines of work carried on by the division of entomology of the North Carolina State Station for the protection of the fruit-growing interests. A list of the larger fruit growers of the State is appended.

Demonstration work in economic entomology, F. SHERMAN, Jr. (*Jour. Econ. Ent., 2 (1909), No. 5, pp. 336–341, pl. 1*).—An account is given of this work as carried out in North Carolina. During 1908, an apple spraying demonstration was conducted in each of 5 different counties in the apple-growing section and in 1909 the work was extended to 12 other counties. Very satisfactory results are reported to have been obtained.

Control of household insects, E. P. FELT (*N. Y. State Mus. Bul. 129, pp. 47, figs. 34*).—Under insects as disease carriers the author considers the typhoid or house fly, fruit fly, malarial mosquito (*Anopheles maculipennis*), and the yellow fever mosquito (*Stegomyia calopus*). The cluster fly (*Pollenia rudis*), wasps and hornets, the rain barrel mosquito (*Culex pipiens*), salt marsh mosquito (*C. sollicitans*), house fleas, bedbug, bedbug hunter (*Opsicœtus personatus*), and house centipede (*Scutigera forceps*) are the annoying forms discussed. The fabric pests mentioned are clothes moths, carpet beetles, silver fish (*Lepisma domestica*), book louse (*Atropos divinatoria*), white ants and crickets. The food pests considered are house ants, cockroaches, larder beetle, cheese skipper (*Piophila casei*), and several cereal and seed pests. Directions for fumigation with hydrocyanic-acid gas are appended.

FOODS—HUMAN NUTRITION.

Dietary studies in public institutions (*U. S. Dept. Agr., Office Expt. Stas. Bul. 223, pp. 98*).—This bulletin contains two papers, namely, Dietary Studies in Public Institutions in Philadelphia, Pa., by Emma Smedley and R. D. Milner, and Dietary Studies in Public Institutions in Baltimore, Md., by H. L. Knight, H. A. Pratt, and C. F. Langworthy.

In the first of these papers the results are reported of a dietary study in a home for old ladies and of one in an orphan asylum, and of the data obtained regarding the selection of food, methods of preparation, and other questions of institution management. On an average, the food consumed per woman per day by the inmates of the old ladies' home supplied 58 gm. protein and 1,882 calories of energy, the cost being 18 cts. per woman per day. In the orphan asylum the food supplied 67.6 gm. protein and 1,867 calories per child per day.

In the second of these papers the results of dietary studies in Baltimore are given. These studies were made in homes for the aged and in orphan asylums, the institutions selected being regarded as typical of those under municipal management, in which economy is a prerequisite, and those under private management, in which there may be opportunity for more liberal expenditures. The objects of this investigation, as of the studies in Philadelphia, were to secure data regarding the food consumption of aged persons and young children for use in formulating dietary standards, to obtain additional data regarding problems of institution mangement, and to demonstrate the importance from the standpoint of the institution itself of securing information of the character supplied by such nutrition studies.

The data regarding the food consumption in the institutions studied are summarized in the table below. Bayview Asylum, one of the institutions included, is the Baltimore city almshouse, and a large proportion of the inmates are aged men and women. In the case of the other institution the name shows whether the inmates were aged persons or children.

Summary of studies with aged persons and children in public institutions in Baltimore.

Location and subjects of studies.	Number of persons in study.	Average age.	Average weight.	Nutrients and energy.					
				In food eaten.		In food wasted.		Proportion in food wasted.	
				Protein.	Energy.	Protein.	Energy.	Protein.	Energy.
Bayview Asylum:		*Years.*	*Pounds.*	*Grams.*	*Cals.*	*Grams.*	*Cals.*	*Per ct.*	*Per ct.*
Regular inmates, males	136	....	....	144	2,901	4	97	3	3
Chronic inmates, males	82	....	....	93	2,076	2	45	2	2
Receiving-ward inmates, males	82	....	....	111	2,274	1	11	1	....
Average of 3 studies	....	....	....	121	2,504	3	59	2	2
Women inmates, per woman per day	111	....	....	85	1,924	6	134	7	7
Women inmates, per man per day basis	111	....	....	106	2,405	8	168	7	7
Average of 4 studies	411	....	....	117	2,453	4	89	3	3
Entire institution [a]	....	....	....	96	2,398	....	....	....	....
Aged women's home, per woman per day	76	76	....	85	2,206	12	308	14	14
Aged men's home, per man per day	48	75	....	83	2,339	9	304	11	13
German Aged People's Home, per man per day	70	78	137.0	74	2,225	8	265	11	12
Home for Colored Children, boys	25	9	58.6	50	1,677	1	44	2	3
German Orphan Asylum, boys	58	12	59.2	65	1,798	2	55	3	3
German Orphan Asylum, girls	57	12	74.3						

[a] Calculated from food purchased.

The results of the investigations reported in this bulletin are discussed in comparison with data obtained elsewhere and with reference to dietary standards for aged persons and for children.

"On the basis of the work reported in this bulletin and other available data, it seems fair to propose 0.9 as the factor representing the proportion of protein and energy required in old age by a man or woman as compared with a man at moderate muscular work during the period of full vigor, and 0.7 to 0.8 as the factor representing the relative food requirement for extreme old age. The actual quantities of protein and energy will vary according to the basis of com-

parison selected, whether it be food purchased, food eaten, or food digested. The standard proposed is generous rather than the reverse and is in accord with American food habits, and seems a reasonable guide for use in institutions or homes in planning diet for the aged. . . .

"While it is impossible to estimate the amount of external muscular work performed by the children in these studies, they are known to have been moderately active, and it seems impossible that their diet can have been excessive in either protein or energy. On the other hand, it is questionable whether the protein in the first study or the energy in the second can have been sufficient for their best development. It was noted in the individual discussions of these two studies that while the nutrients and energy supplied by the diets corresponded fairly closely to the generally accepted standards, the children appeared to the observer to be rather below the average in general physical development. While there was little sickness in the institutions, the children gave the impression of being younger than they were, and this before any effort had been made to weigh them. In the case of the German Orphan Asylum the body weights were carefully taken, so that there is little likelihood of error from that source. Here again, as in the case of the standards for older children, the most reasonable deduction seems to be that the present standards for children from 9 to 12 years old are a trifle low. Many more observations of the diet of normal children are necessary before the exact amounts required can be determined. In the light of our present knowledge it seems fair to conclude that it would not be wise to allow anything below the standard amounts in children's diets, and in most cases dietitians would be quite justified in exceeding them somewhat."

Physiological and medical observations [including food habits], A. Hrdlička (*Smithsn. Inst., Bur. Amer. Ethnol. Bul. 34, pp. IX+460, pls. 28, figs. 2*).—In this bulletin, which is an exhaustive study of the Indians of the southwestern United States and northern Mexico, the author has included, in addition to other topics, a large amount of data regarding the food habits, growth and development, clothing, and dwellings, as well as the results of studies of muscular force made with a dynamometer.

The principal article of diet of the different tribes is maize which is prepared for use in various ways. Wheat is also used. Next in importance are meat, fat, and beans. Meat is scarce, and "beef and mutton are generally preferred fresh, but are also cut in thin strips and preserved by drying in the sun, constituting the so-called 'jerked meat.' Fresh meat is prepared chiefly by roasting near a fire on one or more sticks; or it is cooked with corn or wheat, and occasionally other vegetables, in a stew. Fat and marrow are more liked and apparently better assimilated by Indians of all tribes than by the whites. . . .

"Beans of many varieties are a more important article of diet, especially to the Mexican Indians, than meat. They are much easier to procure and combine large nutritive value with palatability. They are generally cooked with a little fat into a sort of stew; this is eaten with the tortilla, which serves as a spoon.

"Other important articles of the Indian diet are squashes, melons, sugar cane in the hot valleys of Mexico, and wild and cultivated fruit of many varieties, as well as piñons and other nuts, and some mushrooms."

Fruits and sometimes vegetables are dried for winter use.

Many individual foods are described and details are given regarding the food habits and food preferences of different Indian tribes.

"The unspoiled Indian of our Southwest and of northern Mexico is not lazy; he may rather be termed industrious. Both men and women, from

adolescence, and even earlier, to old age, do considerable work, though they seldom hurry, nor do they care to work for long stretches at a time. Indolence is, however, quite prevalent among the more or less degraded Indians.

"The love of outdoor life and of outdoor sports, especially hunting, horse and foot races, and various games, is general."

Of the different tribes the Otomi of northern Mexico deserve special mention, according to the author, as they carry on their backs bulky and heavy loads for long distances.

"A very large porportion of the food of the Otomi consists of tortillas, beans, and chile. As is the case with all the tribes living in the maguey region, they regard pulque as food." Only a little food is eaten when on the road. Apparently, these Indians are not averse to other sorts of food than those enumerated, as mention is made of the use of pork products.

As regards the dynamometer tests of muscular force, "the pressure force and, in younger subjects, also the traction appear on the average slightly inferior to those in whites. . . .

"The figures [recorded] show that the male Indian, even at his best, does not quite equal, so far as the strength in his hands and arms is concerned, a strong white American; with the women of several of the tribes and white working women of similar ages the relation would probably be closer.

"Muscular force diminishes, particularly in the males, with decrease in height in the tribes. Tall individuals in the same tribe are also the stronger."

An extended bibliography with explanatory notes is included in the bulletin, and as food is one of the topics taken into account in these notes, the bibliography gives much information as to the amount of data which has been recorded on the subject of Indian dietetics.

Wages and living [in Mexico], W. W. CANADA (*Daily Cons. and Trade Rpts. [U. S.], 1910, No. 3685, p. 1*).—Prices are given of a number of food products in Mexico. According to the author, foods for a period of years have steadily advanced in cost to the consumer.

Food consumption in Paris, J. NORMAND (*Écon. Franç., 37 (1909), II, No. 52, pp. 931–933*).—Statistical data are summarized regarding the kinds and amounts of food consumed in Paris.

Foodstuffs in Siam, C. C. HANSEN (*Daily Cons. and Trade Rpts. [U. S.], 1910, No. 3679, p. 12*).—According to the author, the main staple foods produced in Siam are rice, fish, fruits, and vegetables, meat being used in limited quantities only. He notes further that the demand for foreign articles of food is increasing and that western methods of living are gradually replacing the older food habits. The foreign articles of food sold and consumed in increasing quantities are, according to his summary, "wheat flour, canned milk, butter, fish, meats, fruits, vegetables, jams, raisins, figs, prunes, tinned biscuits, and many other kinds of preserved food."

[Notes on the food and living conditions of natives of Tierra del Fuego], C. W. FURLONG (*Harper's Mo. Mag., 120 (1910), No. 716, pp. 217–229, pl. 1, figs. 7, map 1*).—In an article describing the Onas, a native tribe of Tierra del Fuego, whom the author considers primitive men still living in the Stone Age, information is given regarding their food habits, living conditions, and physical endurance. The climate of the region is not favorable to ripening grain and so as the author points out the food of these natives consists almost entirely of meat of wild animals, birds, the blubber of stranded whales, fish, and mussels, these foods being supplemented by a few tasteless berries in their season, and a round, sweetish, mucilaginous fungus.

The author considers the Onas a tall people, the average height of the 11 men who were measured being 5 ft. 9 in. and states that their life involves many hardships and much physical work and that they are capable of great endurance.

Some general principles of dietetics, with special remarks on proprietary foods, D. L. EDSALL (*Jour. Amer. Med. Assoc., 54 (1910), No. 3, pp. 193–196*).—On the basis of his own experience and other data, the author discusses the importance of a thorough knowledge of food values and food requirements in invalid dietetics. He also discusses proprietary foods and gives reasons for his belief that it is not necessary, and seldom desirable, to depend upon them for nourishment.

Proprietary and predigested foods from the standpoint of the pediatrist, J. HOWLAND (*Jour. Amer. Med. Assoc., 54 (1910), No. 3, pp. 196–201*).—The author discusses the character of proprietary foods, the use of predigested medicinal foods, and artificial ferments in infant feeding.

It is not, he concludes, "a narrow view to take that predigested medicinal foods have no reason for existence, that proprietary infants' foods are unnecessary, and that in pediatrics we can almost entirely dispense with [artificial] ferments. The propositions are well supported by fact."

The paper is followed by a discussion which includes also the paper noted above.

Malted foods (*Brit. Med. Jour., 1910, No. 2558, p. 86*).—Analyses of a number of commercial malted foods are reported.

Most of the malt preparations commonly called malted foods "consist of a farinaceous material—most frequently wheat flour—mixed with malt flour, that is, the flour obtained by milling malted barley, or in some cases with dry malt extract. The majority accordingly contain a large proportion of unaltered starch, and this does not undergo digestion to any considerable extent when the food is prepared for use, for the reason that the diastase of the malt will not act on the starch until it has been gelatinized, and when the heat is sufficient to do this it destroys the diastase."

A malted food, as is pointed out, may be expected to contain malt-diastase and this was determined in the goods examined in addition to the usual constituents. It was found to vary from 0 to 161 when determined according to the method of the British Pharmacopœia Codex test, in which the ability of a material to digest its own weight of starch in 30 minutes at a temperature of 40° C. is designated 100.

The importance of fish as a food, J. KÖNIG and A. SPLITTGERBER (*Ztschr. Untersuch. Nahr. u. Genussmtl., 18 (1909), No. 9, pp. 497–537, fig. 1*).—A large amount of data is summarized and discussed regarding the curing of fish, its composition and nutritive value, and its importance as food, and analyses are reported of fish and fish products, which include creatin and other meat bases, and the proportion of different nitrogenous constituents as well as elementary analyses. The heat of combustion of fish flesh was also determined as well as the elementary composition, energy value, and constants of fish fat, and artificial digestion experiments with fish flesh were made in comparison with meat.

In general, the authors conclude that fish flesh is as easily and as well digested as meat and that it may constitute a very important source of nutritive material. Under usual conditions in Germany fresh-water fish sell for much the same price as meat, while salt-water fish are considerably cheaper. It follows, therefore, according to the authors, that sea fish must be selected if it is desired to lower the cost of the diet by using fish in place of meat.

The use of sulphurous acid in chopped meat and the composition of some preservative salts, W. BREMER and R. BEYTHIEN (*Ztschr. Untersuch. Nahr. u. Genussmtl., 18 (1909), No. 10, pp. 593–600*).—The results are reported of the

examination of a number of samples of chopped meat with special reference to appearance and the amount of sulphurous acid and sodium sulphite present. Information is also given regarding the composition of some commercial meat preservatives.

Cooking the cheaper cuts of meat, C. BARNARD (*Housekeeping Expt. Sta. [Conn.] Bul. 6, pp. 17, dgm. 1*).—A number of recipes are given for cooking meats in which so-called fireless cookers are used, the recipes being based on the author's experimental studies of the problem. Comparison is made with the usual methods of cookery.

He concludes that "by means of fireless cooking the thrifty housewife can, with very little money and the minimum of labor, supply her table with good and abundant food that is not only cheap but nourishing, and that can, at the same time, be made attractive and acceptable on any table."

Lecithin and other components of egg yolks, E. TORNANI (*Bol. Chim. Farm., 48 (1909), pp. 520, 521; abs. in Jour. Chem. Soc. [London], 96 (1909), No. 564, II, p. 818*).—According to the author, the proportion of lecithin in egg yolks varies considerably. The yolks of eggs which have apparently kept well exhibit after a time marked alterations in composition, especially with respect to their lecithin and cholesterol content. Marked differences are noted between fertilized and unfertilized eggs.

The hexone bases from egg white, H. G. CHAPMAN and J. M. PETRIE (*Jour. Physiol., 39 (1909), No. 5, pp. 341–345*).—According to the authors' determinations, the protein of egg white contains 2.39 per cent arginin, 0.66 per cent histidin, and 3.19 per cent lysin.

Copper in vegetables, A. MCGILL (*Lab. Inland Rev. Dept. Canada Bul. 192, pp. 11*).—The results are reported of the determination of copper in 70 samples of tinned vegetables, chiefly peas and of French origin, and data are summarized regarding the use of copper for greening foods. It was found that the copper in 42 of the samples examined exceeded the 71 parts per million which, the author states, has been mentioned in Great Britain as the maximum permissible limit.

The author states that he is at present unable "to advise definitely as regards small amounts of copper in vegetables; but would respectfully recommend that medical opinions on the subject be obtained."

Spices and how to know them, W. M. GIBBS (*Buffalo, 1909, pp. 179, pls. 47, figs. 2, maps 3*).—Historical, descriptive, and other data are given in this summary of information on spices, spice growing and marketing. Among the subjects considered are the early history of spices, adulterations of spices, and how to detect them. There are special chapters on the different spices and also a chapter on seasoning herbs.

Coffee extract and coffee infusion, H. STRUNK (*Veröffentl. Mil. Sanitätsw., 1909, pp. 26, 27; abs. in Ztschr. Untersuch. Nahr. u. Genussmtl., 18 (1909), No. 10, pp. 616, 617*).—Noted from another source (E. S. R., 22, p. 369).

Studies of chicory, F. HUEPPE (*Untersuchungen über die Zichorie. Berlin, 1908; rev. in Ztschr. Untersuch. Nahr. u. Genussmtl., 18 (1909), No. 10, pp. 618, 619*).—Analyses of air-dried roasted chicory root are reported.

According to the author, the color of roasted chicory is due to the presence of inulin and sugar in the original root. The potassium salts in organic form which chicory contains, may, in the author's opinion, exercise an unfavorable effect and this and other questions regarding the use of chicory are discussed.

The definition of cider proposed by the international congresses for the suppression of adulteration held at Geneva and Paris, TRUELLE (*Bul. Soc. Nat. Agr. France, 69 (1909), No. 8, pp. 730–740*).—A summary of data and critical discussion of the subject.

The effect of the Glœosporium disease on the composition of currant wine, K. MÜLLER (*Centbl. Bakt.* [*etc.*], *2. Abt.*, *24* (*1909*), *No. 5–7*, *pp. 155–158*).—The analytical data reported and discussed showed that the presence of this currant disease affected unfavorably the composition of currant wine.

Combinations in which phosphorus occurs in wine, P. CARLES (*Bul. Assoc. Chim. Sucr. et Distill.*, *27* (*1909*), *No. 3*, *pp. 217–223*).—A number of determinations are reported of the total phosphorus and phosphorus in mineral and organic combination in wines in the Gironde region.

The sulphur dioxid content of beer, VUAFLART (*Ann. Falsif.*, *2* (*1909*), *No. 14*, *pp. 534*, *535*).—Of the 111 samples examined 97 contained from 1 to 10 mg. per liter of sulphur dioxid and the remaining samples larger quantities.

Studies of the composition of Martinique rums, A. BONIS (*Ann. Falsif.*, *2* (*1909*), *No. 14*, *pp. 521–527*).—On the basis of a considerable number of analyses which are reported, the attempt is made to classify the goods under consideration.

Food inspection decisions (*U. S. Dept. Agr., Food Insp. Decisions 111, p. 1; 112, pp. 3*).—The subjects included are the labeling of yeast and an amendment to Regulation 28 which concerns labeling of derivatives.

With respect to yeast, the position of the Department is "that the term 'compressed yeast', without qualification, means distillers' yeast without admixture of starch.

"That if starch and distillers' yeast be mixed and compressed such product is misbranded if labeled or sold simply under the name 'compressed yeast'. Such a mixture or compound should be labeled 'compressed yeast and starch'.

"That it is unlawful to sell decomposed yeast under any label."

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 123–133, pp. 16*).—The subjects included are the adulteration and misbranding of vanilla extract, wheat flour, sirup, buckwheat flour, lemon extract, rye flour, and olive oil; the adulteration of milk; and the misbranding of canned corn.

Official inspections (*Maine Sta. Off. Insp. 16, pp. 153–164*).—From an examination of a number of samples of commercial thickeners for ice cream the conclusion was reached that these goods contain "no injurious materials. They consist for the most part of starchy materials or gelatin with very liberal amounts of sugar. They are evidently prepared chiefly because of the high price at which comparatively inexpensive materials can be sold. The intelligent maker of ice cream will buy starch, gelatin, or whatever he prefers to use in his cream direct at what the goods are really worth in the market."

A sample of maple sugar used for making maple sirup was declared unlawful because it had been so purified by crystallization that the characteristic maple flavoring materials were not present, "but the case was not prosecuted as all concerned in the matter had evidently acted in good faith."

A number of jams, jellies, and preserves were examined. Brief statements are made regarding the examination of whisky and rice, and cold storage and preserved eggs and the use of chemicals in foods are discussed.

Report of the department of food and drugs, State Board of Health, for October, 1909, H. E. BARNARD (*Mo. Bul. Ind. Bd. Health*, *12* (*1909*), *No. 10*, *p. 143*).—During the month 125 samples of sausage, dried beef, and other food products were examined, of which 29 were found to be illegal.

Inspectors' reports for the month of October, 1909 (*Mo. Bul. Ind. Bd. Health*, *12* (*1909*), *No. 10*, *pp. 143–146*).—Information is summarized regarding the inspection of grocery stores, meat markets, dairies, and restaurant and hotel kitchens. The great majority of the grocery stores and meat markets visited were in good condition, but in general the condition of the dairies and hotel and restaurant kitchens was unsatisfactory.

[Examination of food and drugs and inspection work for November], H. E. Barnard (*Mo. Bul. Ind. Bd. Health, 12 (1909), No. 11, pp. 157–160*).—Brief statements are made regarding the examination of a number of samples of drugs, beverages, and food products, and the inspection of grocery stores, restaurants, and similar places of business.

Text-book of human physiology, N. Zuntz and A. Loewy (*Lehrbuch der Physiologie des Menschen. Leipsic, 1909, pp. XII+763, pls. 2, figs. 306*).—The various chapters in this comprehensive text-book of physiology are contributed by a number of different authors.

Of special interest to students of nutrition are those on General Physiology, by M. Verworn; Chemical Composition of the Animal Body, by J. Müller; General Physiology of Muscles and Nerves, by O. Weiss; Physiology of the Central Nervous System, by S. Exner; Functions of the Peripheral Nerve System, by A. Kreidl; Mechanics of Body Motion, by R. du Bois-Reymond; The Chemistry of Respiration, by J. E. Johansson; The Mechanics and Innervation of Respiration, by R. du Bois-Reymond; Partial Digestion, by Ellenberger and Scheunert; Respiration and Assimilation, by Spiro; Urine and Urine Formation, by Cohnheim; Excretion Through the Skin, by R. Metzner; Internal Secretions and Their Chemical Relation to Body Processes, by R. Metzner; Metabolism of Matter and Energy, by N. Zuntz; and Reproduction and Growth, by A. Loewy.

In the section on internal secretions the relation of the thyroid and parathyroid secretions, the secretions of the hypophysis, the suprarenal capsule, and the thymus, pancreas, and spleen are discussed with special reference to the modern theories of the chemical regulation of body processes.

In the chapter on the metabolism of matter and energy, Professor Zuntz discusses general problems, summarizes the results of his own extensive studies of methods and the results of his experimental work, and devotes attention to respiration experiments, respiration calorimeter experiments, and those in which the respiratory quotient is determined. Nitrogen metabolism, overfeeding, the importance of mineral constituents, the selection of food under different conditions, the protein requirements of man in different circumstances, the factors which influence protein requirements, nitrogen metabolism in the body during growth and repair, condiments in relation to nutrition, and similar questions are also considered.

With reference to the question of dietary standards he concludes that since the relation between resistance to different infectious diseases and the protein content of the diet is not known, it is not desirable at the present time to diminish generally the amount of protein in the diet below 80 gm. per day for an adult man. It is possible to obtain such a quantity of protein entirely from vegetable foods if they are wisely selected, but he considers it much easier and more agreeable to use animal foods in reasonable quantity in combination with the cereals and vegetables which are less rich in nitrogen in order that the needed amount of nitrogen and fat may be secured.

In their introduction the editors state that the volume as a whole is designed especially for the use of advanced students and physicians.

Nutrition diseases—a text-book for physicians and students, F. Umber (*Lehrbuch der Ernährung und der Stoffwechselkrankheiten für Ärzte und Studierende. Berlin and Vienna, 1909, pp. VIII+402, pls. 10, figs. 19*).—In addition to chapters on corpulence, diabetes, gout, the less common disease of intermediary protein cleavage, and similar topics, the author discusses food and nutrients in general, food cures in the case of the insufficiently nourished, and artificial feeding. Though the last mentioned chapters are perhaps of special interest to students of nutrition, a large amount of data of general interest will be found in the sections which deal with pathological questions, particu-

larly with reference to carbohydrate foods and their relation to diabetes, nitrogenous foods and their relation to gout, and similar topics.

The science of nutrition, G. Lusk (*Philadelphia and London, 1909, 2. ed., rev. and enl., pp. 402, figs. 13, dgm. 1*).—The author states that this edition differs from the preceding edition (E. S. R., 18, p. 656) chiefly in containing facts which have been brought to light since the earlier volume was published.

"The aim of the book is to review the scientific substratum upon which rests the knowledge of nutrition both in health and in disease."

The protein question in the light of recently acquired facts, E. Abderhalden (*Ber. Deut. Pharm. Gesell., 19 (1909), No. 8, pp. 451–477*).—A digest of data.

Do differences in the structure of proteins imply differences in nutritive value? J. Zisterer (*Ztschr. Biol., 53 (1909), No. 3–4, pp. 157–200*).—From studies of casein, muscle protein, and aleurone, a special proteid preparation made from wheat, the conclusion is reached that there are differences in the physiological effect of proteids attributable to differences in composition, but that although there are decided differences in the cleavage products of proteids, the differences in physiological value are not great enough to have practical value. The experimental work was carried on with dogs and the income and outgo of nitrogen was taken into account as well as other similar factors.

The effects of a meat diet upon the organism of the rabbit, Garnier and L. G. Simon (*Arch. Méd. Expt. et Anat. Path. [Paris], 24 (1909), No. 6, pp. 721–743*).—On the basis of experiments which are reported, the author concludes that rabbits are capable of digesting meat but that animal protein is toxic to them.

The importance of the mineral constituents of foods, H. Ingle (*Jour. Roy. Inst. Pub. Health, 17 (1909), No. 12, pp 736–747*).—The author summarizes and discusses data on the importance of mineral constituents in animal feeding and in infant and adult dietetics, laying special stress on the ratio of phosphorus pentoxid to calcium oxid.

In infant feeding it is the author's opinion that "it is not the deficiency of lime, but the preponderance of phosphoric acid that renders cows' milk, especially if pasteurized, sterilized, or 'humanized,' more liable than human milk to induce malnutrition of bone in infants."

In discussing farinaceous foods with reference to ash constituents, analyses by A. E. Humphries of 4 samples of typical modern flours are quoted, lime, magnesia, potash, and phosphorus pentoxid being determined. In these samples the ratio of lime to phosphorus pentoxid varied from 0.132 to 0.160, the average being 0.146, a value higher than that recorded in earlier analyses.

Even taking the recent higher figures into account it is evident, in the author's opinion, that "in flour, and thus in bread, etc., there is a decided preponderance of phosphoric acid. Rye bread and products made from maize, barley, and other cereals also contain the two mineral constitutents in approximately similar proportions. No doubt the magnesia present partially compensates for the deficiency of lime, but, after allowing for this, it is probable that for the most favorable conditions for bone development there is an undue excess of phosphoric acid in almost all cereal foods.

"In view of what has been shown with reference to the ash constituents of cereal grains, and the fact that they form so large a portion of the ordinary human diet without ill effects, it would seem that, for adults at least, it is not necessary that the lime should be equal to the phosphorous pentoxid in the whole ratio—an assumption to which several considerations had led in discussing animal foods.

"This may be due to the requirements of man being different to those of animals, which is, indeed, probably the case; but another factor, which has not been sufficiently studied, is the proportion of the total phosphoric acid found in the ash, which is derived from phosphorus occurring in the food in the state of organic combination—e. g., in the form of lecithin.

"It may be that such phosphorus is not converted into phosphoric acid in the body and would therefore not act harmfully in bone nutrition, and that the really important ratio is that of lime to the phosphorus pentoxid existing as acid in the food. This aspect of the question deserves further study."

The effect of a 24-hour fasting on the secretion of gastric juice, L. Rütimeyer (*Zentbl. Inn. Med., 1909, No. 10, pp. 233–241; abs. in Zentbl. Physiol., 23 (1909), No. 18, p. 613*).—From experiments with a woman 38 years old who was a professional faster the author concludes that after a 24-hour fast the stomach secretes only a small amount of slimy liquid. When stimulated by a test breakfast, gastric juice is at once secreted, but this, however, contains much less hydrochloric acid than is usual, the ratio being 6:16, and also somewhat less ferment. The gastric juice, nevertheless, was regarded as adequate for digestion.

The chemistry of fat in the intestine, A. Richaud (*Presse Méd. [Paris], 1909, No. 102, pp. 921–923*).—In this discussion of the subject the author has summarized the work of a number of investigators on the digestibility of fat and the estimation of fat in the feces.

Observations on the influence of lactic-acid ferments upon intestinal putrefaction in a healthy individual, Helen Baldwin (*Jour. Biol. Chem., 7 (1909), No. 1, pp. 37–48*).—The special object of the investigation reported was to determine the effect of fermented milks in controlling intestinal putrefaction when a general mixed diet, including meat, was taken.

According to the author, it was found "that they exerted no specially favorable influence in this way, but in so far as the subject's condition varied it was better when the lactic-acid ferments were not added to the general diet."

"Emphasis should be laid upon the fact that the observations in this paper have no bearing upon the use of fermented milks alone or with a diet free from meat. The giving of protein in the form of milk rather than of meat regularly reduces the amount of intestinal putrefaction. The fermented milks give a variety to a milk diet, they are found by many to be more appetizing and refreshing than plain milk, and in certain forms of gastric and intestinal indigestion they are better borne than plain milk."

Some effects of sodium benzoate, D. R. Lucas (*Proc. Soc. Expt. Biol. and Med., 6 (1909), No. 5, pp. 122–126; Pure Products, 5 (1909), No. 12, pp. 626–629; Jour. Amer. Med. Assoc., 54 (1910), No. 10, pp. 759–766*).—Quotations from the author's summary of his experimental data and conclusions follow:

"Sodium benzoate, in concentrations of about 1 per cent, preserves fruits and vegetables which are strongly acid. Crystals of free benzoic acid often appear in such mixtures. Sodium benzoate (1 per cent) added to weakly acid fruits and vegetables does not preserve them well. Sodium benzoate (1 per cent) added to fruits and vegetables, the acidity of which has been neutralized, does not preserve them. Pure apple juice, containing 0.1 per cent of sodium benzoate, developed mold after 10 days; commercial benzoated cider under the same conditions, without the further addition of benzoate, did not develop mold or otherwise undergo degeneration.

"Acid fruit juices containing 1 per cent of sodium benzoate have a biting taste, an effect due to the liberated benzoic acid. Milk or alkaline vegetables treated with sodium benzoate (1 per cent) do not taste of benzoic acid at any time during the first 24 hours after the treatment. After 24 hours, however,

acid decomposition begins in milk in spite of the presence of 1 per cent of sodium benzoate, when the mixture tastes distinctly of benzoic acid."

In experiments with men to compare pure and benzoated cider the author states that a burning taste, headache, and other unfavorable symptoms were noted with cider containing the preservative.

"Small doses of sodium benzoate given with acid substances to patients with albuminuria aggravated this condition and caused alarming symptoms, classical of nephritis—for 6 days thereafter in one subject."

Some experiments with dogs on the effects of benzoic acid are also briefly reported.

ANIMAL PRODUCTION.

The problems of life, E. Giglio-Tos (*Les Problèmes de la Vie.—I, La Substance Vivante et la Cytodiérèse, Turin, 1900, pp. VIII+286, figs. 33; II, L'Ontogénèse et ses Problèmes, Cagliari, 1903, pp. V+368, figs. 36; III, La Fécondation et l'Hérédité, Cagliari, 1905, pp. VII+189, fig. 1; IV, La Variation et l'Origine des Espèces, Cagliari, 1910, pp. VII+222*).—This work on speculative biology attempts to interpret vital phenomena in terms of physics and chemistry. It is stated that the nature of living processes is more simple than is generally supposed, and that there is no need of assuming a special vital force not known to chemistry or physics.

The theories advanced are illustrated by diagrams and mathematical formulas. Part 1 treats of the properties of the living substance and the process of cell division, which is summarized in the form of 28 "laws." The development of the growing organism is discussed in part 2 as consisting merely of chemical differentiation of tissues. The topics treated in part 3 are fertilization, maturation, parthenogenesis, and heredity. The concluding part discusses variation, the origin of species, adaptation, and the origin of life, and contains 15 "rational laws of hybridization" and a general summary of the entire work.

The importance of slaughterhouse studies and anatomical investigations for animal breeding, H. Kraemer (*Mitt. Deut. Landw. Gesell., 24 (1909), No. 44, pp. 662–665*).—This is a summary of recent investigations such as those of Seeberger (E. S. R., 21, p. 776) and others, on the relation of form to physiological function by studies of the anatomy of domesticated animals at slaughterhouses and in the laboratory. It is pointed out that further studies along these lines would be of great value to the practical breeder.

The fitness of twins in cattle [and in sheep] for breeding, Strebel (*Deut. Landw. Presse, 36 (1909), No. 84, pp. 897, 898*).—A discussion of data.

A study of the Simmental herd book kept at Hohenheim since 1885 showed that during the period covered there were 2,521 births, of which 116 were twins. In 28 cases both were heifers, in 35 cases both bulls, and in 53 cases the sexes were unlike. Twins were more common with old than with young cows and could be traced to 44 out of 55 bulls used during the 75 years. There were 9 pairs of twins in the progeny of 1 bull which was used for 2 years. The progeny of the heifer twins could be traced in only 1[illegible] cases, in half of which both twins were heifers. In three of these cases both heifers were fertile, while in the other 5 only 1 twin was bred, the other being weak and sent to the butcher. Of the 11 which were bred none gave birth to twins, nor did their offspring up to the fourth generation. Of the 8 cases where the sexes were different 7 of the heifers were sterile, and 1 was fertile but bore a sterile heifer.

Data concerning fertility of twins in sheep were obtained from a Württemburg flock book covering a period of 40 years, in which time 190 twins were

recorded. In 51 cases both were ewes and 4 ewes out of 37 were sterile. In 93 twins of unlike sex 5 out of 36 ewes were sterile. The breeding of the other ewes could not be traced.

These figures indicate that a "free-martin" is more likely to occur in cattle than in sheep whenever the twins are of unlike sex.

History of Hereford cattle, J. Macdonald and J. Sinclair (*London, 1909, rev. ed., pp. XVI+501, pls. 31*).—A new edition of this well-known work, first published in 1886, revised and enlarged to include an account of the recent development of the breed.

The draft horse, P. de Choin (*Ann. Inst. Nat. Agron., 2. ser., 8 (1909), No. 2, pp. 275–310, figs. 4*).—It is pointed out that the methods now in use for judging draft horses are crude. A more extensive use of the dynamometer is recommended. The topics treated in a discussion on the utilization of the motive power of the horse to better advantage are road building, methods of harnessing, driving, and the construction of vehicles.

Report on the stock show at Prek-Po, Baudoin (*Bul. Écon. Indo-Chine, n. ser., 12 (1909), No. 80, pp. 451–473, figs. 11*).—This contains an account of the live stock industry in Cambodia, French Indo-China. Descriptions and measurements are given of zebus, buffaloes, and horses exhibited at the annual fair.

Data on certain factors influencing the fertility and hatching of eggs, R. Pearl and F. M. Surface (*Maine Sta. Bul. 168, pp. 105–164, dgms. 2*).—This bulletin presents data to show that fertility of the hen's egg and its ability to hatch are two essentially different things, and also reports a quantitative study of the relationship between these two properties and their inheritance in the offspring.

The correlation between fertility and hatching quality was numerically determined for 2 seasons. "So far as the present data indicate there is a small but still sensible correlation between the fertility and hatching quality of eggs. This means that in general or on the average the hen whose eggs run high in fertility will also tend to show a high hatching quality of eggs (percentage of fertile eggs hatched) and vice versa."

The mean or average percentage of infertile eggs, as shown in the breeding records of the 1908 group of birds, was 21.71. This high percentage is explained because of the unsuitable housing conditions. In 1909 the average percentage of infertility, taking all the birds of the year together (the returns on 5,000 to 6,000 incubated eggs), was 14.14. If the early portion of the breeding season had been left out of account, the average percentage of infertility would have been considerably reduced.

The average percentage of fertile eggs hatched in the 1908 season was 37.24, and in 1909 50.68. The degree of absolute variability as measured by the standard deviation in all but one case was somewhat greater in the case of hatching quality than in the case of fertility. While hatching quality appeared to be a slightly more variable character than fertility, the opposite was the case if the degree of variation in proportion to the mean is considered. Both the fertility and hatching quality were much better when the breeding was done in a curtain-front house.

"It is shown that the individuality of the female bird is a very important factor in the determination of the fertility of eggs. Different individual females have characteristic degrees of fertility of their eggs, independent (within limits) of the character of the male bird with which they are mated. This fact emphasizes the importance to the breeder of trapnesting through the breeding season at least."

There was proportionately less variability among the cockerels used as breeders than among the pullets in respect to their influence in determining the fertility of eggs.

"The present statistics indicate that there is no correlation whatever between winter (November to March) egg production and the fertility of eggs laid during the subsequent hatching season. In other words, the eggs of the heavy winter layer are not more likely on the average to be infertile than are those of the light winter layer, other conditions being the same.

"There is a distinct correlation between the winter (November to March) egg production and the percentage of fertile eggs hatched during the subsequent breeding season. This correlation is of such sort as to indicate that in general the higher the winter egg production of a particular bird the lower will the percentage of that bird's fertile eggs hatched probably be and vice versa.

"The present statistics do not show any marked superiority of hens over pullets in respect to breeding performance so far as either fertility or hatching quality of eggs are concerned. It must be understood that this is merely a statement of fact and does not constitute any recommendation for the use of either pullets or hens as breeders. That question involves more than the two factors here under discussion.

"There is no indication that the fertility of eggs in the pullet year and in the second breeding year are in any way correlated. In other words, a bird whose eggs run high in fertility in the pullet year is as likely as not to produce eggs running low in fertility the second year, and vice versa, when mated with the same male or with males of essentially equal breeding ability as shown by their pen averages.

"There is a significant positive correlation between the percentage of fertile eggs hatched in the pullet year and in the second breeding year. In other words, the bird whose eggs are of superior hatching quality in the pullet year will, on the average, show the same characteristic in her second year."

A study of inheritance of fertility and of hatching quality between mother and daughter, between father and daughter, and between sisters showed that there is no evidence that the character "fertility of eggs" is in any degree inherited. The character "hatching quality of eggs" is definitely inherited in the female line and apparently also in the male line.

"Taking all the results of the paper together, it is evident that fertility and hatching quality of eggs are very different characters. While there are great individual differences among different females in respect to the fertility of their eggs, even when mated to the same male, it still remains the fact that this character, as compared with hatching quality of eggs, is to a very large degree influenced by external circumstances. . . . On the other hand, the hatching quality of eggs is an innate constitutional character just as much intrinsic as any other physical character, such as shape of body or length of limb.

"The present study has shown that high winter egg production has, on the average, an adverse effect on the hatching quality of the eggs produced by the same birds in the subsequent hatching season. This again can probably be regarded as the result of a reduction of constitutional vigor following heavy laying. Continued heavy egg production involves great metabolic activity on the birds' part in the transformation of matter and energy and must fatigue the organism. . . .

"The data presented in this paper emphasize the importance in practical breeding work of (a) the selection of breeding stock with reference to constitutional vigor or vitality, (b) the maintenance of the breeding birds in a vigorous

condition by proper methods of housing and feeding, and (c) paying attention to the actual breeding ability (as shown by hatching performance) of the stock and the exercise of selective breeding to improve this character."

An annotated bibliography of the literature is appended.

An act to regulate the sale of concentrated commercial feed stuffs (*Massachusetts Sta. Circ. 17, pp. 4*).—This contains the text of the feeding stuffs law and interpretations of the law.

The rôle of the ash constituents of wheat bran in the metabolism of herbivora, E. B. Hart, E. V. McCollum, and G. C. Humphrey (*Wisconsin Sta. Research Bul. 5, pp. 173–188*).—Previously noted from another source (E. S. R., 21, p. 366).

Further contributions on the composition of hay from sewage meadows, P. Ehrenberg (*Landw. Vers. Stat., 71 (1909), No. 4–5, pp. 263–286*).—A continuation of work previously noted (E. S. R., 20, p. 172). Analyses reported show that hay from sewage meadows contains larger percentages of protein, albumin, fat, and ash but less fiber than hay from natural meadows. Analyses are also given of clover grown on sewage meadows and of silage made from sewage hay.

Acidifying silage beet chips by means of lactic acid cultures (*Amer. Sugar Indus. and Beet Sugar Gaz., 12 (1910), No. 2, p. 39*).—This is a report of a successful experiment in which beet chips as they came from the diffusion battery were inoculated with a pure culture of lactic-acid bacteria. At the end of 6 months the chips had an aromatic odor of fresh distillery chips. The effect of the inoculation was not sufficient to give a pure lactic fermentation but was such as to restrict the activity of the decomposition organism. Directions for preparing the liquid for sprinkling the chips are given.

Experiments in feeding these chips to steers with favorable results are also reported.

The utilization of pea-cannery refuse for forage, M. A. Crosby (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 45, pp. 12, figs. 3*).—This bulletin describes methods of using refuse pea vines as green feed, silage, hay, and fertilizer. Results from practical men are cited which show that pea vine silage is about equal in feeding value to corn silage for dairy cows, beef cattle, and sheep. Pea vine hay is considered equal or superior to clover hay for all classes of farm stock. The use of the vines as a soiling crop is necessarily limited to the immediate vicinity of the canning factory. As a manure pea vines have a fertilizing value of about $2.60 per ton.

Concerning the feeding of straw, E. Pott (*Illus. Landw. Ztg., 29 (1909), No. 101, pp. 927–929*).—A summary and discussion of methods of cutting, shredding, steaming, softening, and mixing with molasses, and of other practices for utilizing straw and coarse fodders as feeding stuffs for cattle is given.

Rearing calves on skim milk and supplementary feed, H. W. Norton, Jr. (*Michigan Sta. Bul. 257, pp. 3–29, figs. 10*).—This bulletin contains information on stabling and methods of feeding calves and gives records of 63 pail-fed calves which include grade and pure bred stock of both beef and dairy types. The feeds consisted of whole milk, skim milk, silage, hay, oats, green feed, beet pulp, and grain. Whole milk was valued at $1 per 100 lbs., and skim milk at 20 cts. The whole milk was usually fed for 5 or 6 weeks, with the exception of the last lot, in which it was continued for 12 or 13 weeks. In some cases the skim milk feeding continued for 1 year. The year was divided into 4 equal periods of 13 weeks each. As a rule the greatest gains were made during the second period and at the least cost.

Tables are given which show the cost of feed, gains in weight, birth weight, and other data. The average results obtained from the different groups of calves are shown in the following table:

Average birth weight, amount, and cost of gain of calves during the first year.

Number of animals.	Kind of stock.	Average birth weight.	Average weight at end of year.	Average cost per animal.	Average daily gain per head.	Average cost per pound gain.
		Pounds.	*Pounds.*	*Dollars.*	*Pounds.*	*Cents.*
10	Grade beef (Shorthorn sire)	76.4	643.9	27.69	1.55	4.32
10	Grade beef (Hereford sire)	80.0	629.0	26.78	1.50	4.20
10	Grade beef (Angus sire)	72.0	682.0	32.53	1.67	4.79
11	Grade dairy	75.7	523.5	22.41	1.22	4.29
10	Mixed	92.2	697.1	27.35	1.65	3.97
6	Pure-bred Holstein	100.0	773.1	30.53	1.84	3.97
6	Grade dairy	72.6	706.1	36.43	1.73	5.16

Feeding the pig, W. DIETRICH (*Illinois Sta. Circ. 133, pp. 19+Errata Sheet, figs. 3*).—This circular contains additional data to those previously reported (E. S. R., 20, p. 1068) of an experiment in pig feeding now in progress, and also outlines a method for calculating rations according to a standard advocated by the author.

Considerable emphasis is given to the intake of water, which is classified as a nutrient, and to the value of exercise for young pigs. The total quantity of water fed seemed to be of greater importance than the manner in which it was fed, but the best results were obtained by feeding the bulk of the water after the rest of the feed had been eaten, using enough water to wet the dry feeds and enough feed in the water to make it palatable. On giving the pigs dry feeds or a thick slop and then free access to water, they did not do as well as in cases where the water was mixed with all the dry feeds in the form of a slop. "One of the principal reasons that winter feeding of pigs has not been more successful is because an insufficient amount of water was used. During the winter season in cold climates where the pig is given dry feed and free access to water, he will apparently not drink enough for maximum and most economical production." The chief value of exercise appeared to be in the influence it exerted upon the respiratory and digestive functions. The results of feeding on pasture indicated that pigs can utilize to better advantage the same quantities of nutrients in addition to the grass than when fed in the dry lot experiments, this being due in part to the needed exercise which the pigs get in grazing.

The amounts of water, carbohydrates, and protein required by pigs at different ages, according to the author's standard, are represented in graphic form. In the case of crude digestible protein the amount required by the pig daily per 100 lbs. live weight, for the most economical production is 0.6 lb. at 2 months of age, increasing to 0.7 lb. during the following 7 weeks. The amount then declines to 0.6 lb. during 4 weeks' time and then maintains a level of 0.65 lb. for the next 7 weeks. After this the greater part of the nitrogenous feeds may be removed from the ration. Starting at 2 months of age the pigs should have 12 lbs. of water daily per 100 lbs. of live weight, this to be gradually reduced to 4 lbs. during the following 6 months, when the pigs should be in prime condition for market. At 2 months of age the pigs should have 2.2 lbs. of digestible carbohydrate daily per 100 lbs. live weight, this amount gradually increasing until at the end of 18 weeks it reaches 2.6 lbs. The pigs will apparently make larger gains when given a little more fat in their ration than is ordinarily present in the common feeds on the farm. They should also have free access

to a variety of mineral substances in order to supply, according to the dictates of appetite, any deficiencies in the feed.

Examples are given for calculating rations.

Spanish peanuts, soy beans, and skim milk as feeds supplementary to corn, P. N. Flint (*Georgia Sta. Bul. 87, pp. 3–10, figs. 4*).—This is a report of a feeding experiment in utilizing home-grown feeds for pigs. The pigs varied in age from 3 to 4 months and had an average weight of 76.9 lbs. The feeds were rated as follows: Shelled corn 94 cts. per bushel, shorts $1.87 per hundredweight, skim milk 20 cts. per hundredweight, soy beans $2.38 per acre net cost, and Spanish peanuts $3.38 per acre net cost.

A lot of 3 pigs fed shelled corn and shorts 1 : 1 for 31 days, and then corn alone for 48 days, made an average daily gain of 0.71 lb. per head at a cost of 8.3 cts per pound. The corresponding figures for a lot of 6 pigs fed shelled corn and skim milk was 0.96 lb., at a cost of 6.8 cts. On a shelled corn and fresh soy beans ration there was an average daily gain per head of 0.7 lb., at a cost of 5.6 cts. per pound, and on a ration of shelled corn and fresh Spanish peanuts the corresponding values were 0.9 lb., and 4.6 cts.

Data are also given on the cost of growing soy beans and Spanish peanuts.

Yeast as a feeding stuff (*Wchnschr. Brau., 27 (1910), No. 2, p. 18*).—Two pigs weighing about 22 lbs. each were fed a ration of potatoes, ground barley, and yeast. The amount of yeast fed daily to each animal varied from 1 liter at the beginning to over 10 liters at the close of the trial. It was apparently relished by the pigs. At the end of 5 months the average weight was 190 lbs. each. The average dressed weight after slaughtering was 83 per cent of the live weight.

Report of the departmental committee on poultry breeding in Scotland, J. Murray et al. (*Edinburgh: Govt., 1909, pp. IV+18*).—This report is the result of an inquiry upon the methods commonly followed in the highlands and islands of Scotland in the breeding and keeping of poultry and the sale of poultry and eggs, and especially into the results of the efforts of the Congested Districts Board to promote this industry and to suggest how it may be developed and improved.

Minutes of evidence taken before the departmental committee on poultry breeding in Scotland (*Edinburgh: Govt., 1909, pp. XXVIII+148*).—This contains the statements made by men engaged in the poultry business in Scotland and forms the basis of the report noted above.

Poultry breeding, T. Huperz (*Die Geflügelzucht. Neudamm, 1907, 3. ed., rev. and enl., pp. VIII+350, pl. 1, figs. 78*).—The third revised and enlarged edition of this practical book on the breeding, feeding, and rearing of fowls, turkeys, guineas, ducks, geese, and pigeons.

The dollar hen, M. M. Hastings (*New York, 1909, pp. 217, figs. 4*).—This book, according to the author, was written "for the purpose of assisting in placing the poultry business on a sound scientific and economic basis." The topics treated are incubation, feeding, management of poultry, marketing of eggs, and other phases of poultry production upon which the financial success of the business depends.

The author makes statements regarding poultry work at the Illinois Station, and gives an alleged quotation from its publications which turns out to have no basis whatever in fact. That station has not carried on any poultry work or published anything on the subject, and the hypothetical experiment described is of such a character as to be an unjustified reflection on experiments in that line.

The marketing of eggs, A. G. Philips (*Kansas Sta. Bul. 162, pp. 243–258*).—This bulletin contains statistics on the egg production of Kansas and general

information on marketing eggs, obtained in part from and in answer to inquiries sent to egg buyers. Suggestions are given for preventing losses that now occur because many bad eggs are sent to market.

Judging and valuation of ostrich feathers and feathers required by the trade for special purposes, R. W. THORNTON (*Agr. Jour. Cape Good Hope, 35 (1909), No. 6, pp. 680-686, figs. 7*).—A discussion of the types of feathers in greatest market demand.

DAIRY FARMING—DAIRYING.

The efficiency, economy, and physiological effect of machine milking, F. W. WOLL and G. C. HUMPHREY (*Wisconsin Sta. Research Bul. 3, pp. 61-148, figs. 9*).—The experiments reported in this bulletin covered a period of 20 months and involved 29 different cows.

In 40 trials during a period of 26 weeks there was a wide variation in the rate of decrease in the weekly production of milk when a change was made from hand milking to machine milking, but on the average the decrease was no greater than that from a change in hand milkers. Comparisons were obtained for 10 days with cows on machine milking and for corresponding periods on hand milking the same cows for from 1 to 4 years for the various cows. The average weekly production for the cows during the machine milking was 152.1 lbs. of milk and 7.11 lbs. of butter fat, and during the corresponding previous lactation periods on hand milking 162.7 lbs. of milk and 7.53 lbs. of butter fat.

Unfavorable results obtained with the machine at one time were thought to be due to the use of a too high vacuum. "In order to avoid any injurious influence on the milk-secreting power of the cows, it is evidently of vital importance not to maintain a higher vacuum than 16 in. at a maximum, and, in case of a mixed herd, to maintain as uniform a vacuum of 15½ in. as possible." More or less trouble was caused by abnormally small or large teats or when the teats were very close together. A fleshy or ill-shaped udder also interfered with the efficiency of the machine.

As regards thoroughness of the milking, the conclusion reached was that after the cows had become accustomed to the machine it is practically equal to that of good hand milking and is doubtless superior to that done on many dairy or other farms. The amount of fat in the strippings did not tend to increase in machine-milked cows when kept in the stable. The results were also satisfactory for pasture conditions in the case of most cows. Although definite conclusions were not reached, it was thought that possibly machine milking not followed by stripping will have an injurious effect on the cows which do not give down their milk readily. It is pointed out that from a financial point of view it will probably not pay to install a milking machine except in the case of large herds or where a farmer with a small herd wishes to be independent of hired help.

An investigation of the bacterial content of machine-drawn and hand-drawn milk was made by E. G. Hastings and C. Hoffmann. Bacterial counts showed that in the case of samples from the individual animals the results are slightly in favor of the machine; with the composite samples the reverse is true. No difference in the content of acid-forming, liquefying, and inert bacteria was noted. A series of determinations of the number of leucocytes present in the milk of a number of animals was made before and after the introduction of the machine, but in no case was there any marked change.

A study of the effect of machine milking on the udder was made by A. S. Alexander, who found no appreciable effect upon the physical condition of the

cows. "It was apparently responsible for improvement in the udders of 3 of the cows and in 2 instances possibly caused aggravation of abnormal conditions previously noted."

Inquiries were sent to Wisconsin dairymen concerning their experience with milking machines. Twenty-seven out of 41 different farmers reporting their experiences were favorable to this method of milking, 8 were undecided, and 6 reported unfavorably. An appendix to the bulletin contains a brief history of the B. L. K. milking machine, and gives full notes on the behavior of the individual cows in the milking machine trials reported.

The dairy cow's record and the stable, L. ANDERSON (*California Sta. Bul. 204, pp. 63–90, figs. 24*).—This bulletin contains records of dairy cows, methods of feeding, and cost of milk production in different parts of the State. There are also illustrations and descriptions of several corrals and milking stables. C. W. Rubel contributes a brief article on What is a Good Record.

The Wisconsin dairy cow competition, F. W. WOLL (*Wisconsin Sta. Circ. Inform. 9, pp. 9*).—This circular discusses the value of cow testing, explains the method and rules of conducting the Wisconsin dairy competition, and contains a list of prizes offered for the best individual and herd records.

Winter milk production, J. WATSON and J. MCROBERT (*Dept. Agr. and Tech. Instr. Ireland Jour., 10 (1909), No. 1, pp. 14–34, pls. 6*).—A continuation of work previously noted (E. S. R., 21, p. 673). On one farm the profit in milk production per cow in winter was £3 1s. 8d. and in summer £1 10d. On another farm where the cows were poor milkers there was a loss per cow in winter of £4 17s. 2d. and in summer of £4 14s. 2d. The milk yields of the cows on each farm and the cost of feed per week are presented in graphic form.

The production price of milk, L. NANNESON (*Malmö. Läns Hushåll. Sällsk. Kvrtlsskr., 1909, No. 2, pp. 429–436*).—A discussion of the various factors influencing the cost of production of milk.

The different items of expense (milking, care, litter, renewal of herd, stabling, interest on the value of cows, feed, and sundry expenses) under Swedish conditions, according to the author approximate 140.40 krone per year per cow, and 10.79 öre per kilogram (about 2.7 cts. per quart) of milk. This is about 30 per cent above the present average market price of the milk, but the deficit must be more than covered by the values of the calf and of the manure produced, though these can only be loosely estimated. The solution of the problem facing the dairy farmer is twofold, to feed the dairy herd effective rations of the lowest possible cost and to increase the returns per feed eaten. In both directions the possibilities for improvement in most herds are great, and considerable progress has been made during recent years, as disclosed by the reports of the cow testing associations (E. S. R., 22, p. 476).

Dairy suggestions from European conditions as seen in the British Isles, Holland, and Denmark, W. J. FRASER and R. E. BRAND (*Illinois Sta. Bul. 140, pp. 461–521, figs. 92*).—This bulletin reports a study during an entire summer of the methods employed in the production of milk on the farms of the intensive dairy countries of Great Britain, Holland, and Denmark.

In the opinion of the authors the chief particulars in which the European dairymen excel are uniformly good cows, economical feeding, painstaking care of the stock, and sanitary methods of handling milk, cream, butter, and cheese. Among other items noted from which American dairymen might profit the following may be mentioned: Successful dairying in the County of Ayrshire, Scotland, is due to the milk-producing capacity of the cattle and the excellence of the Scotch cheese, the high quality of which lies not so much in the skill of the cheese maker as in the care of the cows, stable, cheese room, and utensils, thus keeping the milk clean so that it is delivered to the cheese vat in almost

perfect condition. British agricultural stock and dairy shows differ from American shows because they are conducted for the sole purpose of stimulating interest in agriculture. In Holland and Denmark dairying is the chief agricultural industry and not a side issue. Small holdings and cooperation have enabled Denmark to lead other nations in dairying.

[Literature on fermentation and other changes in milk], A. KOCH (*Jahresber. Gärungs-Organismen, 17 (1906), pp. 298–425*).—This bibliography refers (p. 418) to literature published in 1906 relating to changes in milk due to bacteria, enzyms, and other causes. Abstracts are given of the more important articles.

Biological investigations of milk which creamed abnormally, A. WOLFF (*Milchw. Zentbl., 5 (1909), No. 12, pp. 530–538, pls. 2*).—This is a study of a sample of milk in which the cream rose very rapidly. The layer of milk next to the cream was of a bluish color, and small clots in the milk adhered to the sides of the milk vessel. The butter made from the cream was also abnormal and became rancid in a much shorter time than usual.

A microscopical examination showed that the fat globules were very large and irregular in shape. A few colostral bodies and leucocytes were found but no streptococci. The cause of the trouble was apparently an alkaline forming bacillus which was present in large numbers. *Bacterium fluorescens* may have contributed somewhat to the bluish coloration. The alkaline bacillus was found in freshly drawn milk and water taken from a well on the farm, and seemed to be widely distributed about the premises. Samples of abnormal milk from other sources were also found to contain the same bacillus.

The bacterial flora of milk held at low temperatures, M. P. RAVENEL, E. G. HASTINGS, and B. W. HAMMER (*Jour. Infect. Diseases, 7 (1910), No. 1, pp. 38–46*).—A report of a study of the activity of the bacterial flora of milk and water kept from 6 to 203 days at −9 and 0° C.

"In milks held at −9° there was a clumping of the casein and fat, no increase in bacteria developing on agar and gelatin, and an increase in the amount of soluble nitrogen and a decrease in the acidity.

"In milks held at 0° there was a marked increase in the bacterial content resulting in an increase in acidity, an increase in the percentage of soluble nitrogen so that it eventually amounted to over 70 per cent of the total nitrogen, and a decrease in the total nitrogen content probably due to a liberation of free nitrogen."

The data shows that the ordinary temperature at which milk is stored, 33 to 40° F., is such as to exclude the growth of the ordinary lactic bacteria, but not the growth of the putrefactive organisms.

In practical effects cold storage is identical with pasteurization, since it removes from the sphere of action that class of bacteria that prevent the growth of harmful kinds of organisms, while it allows the harmful bacteria to develop.

Composition of market butter, C. E. LEE and J. M. BARNHART (*Illinois Sta. Bul. 139, pp. 441–457*).—The object of this investigation was to study the composition of butter found on the market.

The average composition of 574 samples of market butter collected from several States for a period of 1 year was as follows: Water 13.54, fat 83.2, salt 2.25, and casein and ash 0.9 per cent. There was no difference in composition of buter caused by the season of the year, the State where it was made, or the dealer by which it was handled. The variation in composition of samples taken from the churn in different creameries was not greater than the samples taken from any single creamery. The average composition of 60 samples of butter exhibited at the National Creamery Buttermakers' Convention

held at St. Paul, Minn., 1908, was as follows: Water 12.54, fat 84.65, salt 1.77, and casein and ash 1.02 per cent.

Acidity of creamery butter and its relation to quality, C. LARSEN, T. H. LUND, and L. F. MILLER (*South Dakota Sta. Bul. 116, pp. 573–594*).—This is a study of the relationship between the quality and acidity of butter.

Several methods of testing butter for acidity were tried. The use of hot water at different temperatures was found to be less satisfactory than the ether and alcohol method. Gasoline and benzin were found unsatisfactory. The provisional official method gave lower results than the ether-alcohol method, especially in fresh butter, since it showed the acid in the fat only, while the ether-alcohol method showed the acid in all the constituents of butter. Another reason which in a measure accounts for the lower results by the provisional method is the high temperature of the fat at the time the test is made.

The acidity of the fat in fresh butter was found to be slightly greater than that of an equal weight of clear brine but less than that of an equal weight of curdy brine. In 16 samples of butter 12.8 per cent of the acid was in the brine and the remainder in the fat.

When butter from various sources was scored and tested for acidity, the average relation between score and acidity of 305 tubs was as follows: In 99 tubs scoring 93 and above the average acidity, measured in cubic centimeters tenth-normal alkalis, was 1.97; in 158 tubs scoring 89 to 93, 1.93; and in 48 tubs scoring below 85, 2.08.

"From these results it will be noticed that there is little or no uniform relation existing between the quality and the acidity of fresh butter. . . . The defects associated with the body, color, and salt, and the flavors of a nonacid character, none of which can be measured by an acid test, evidently constitute the chief faults of fresh butter. When fresh butter has once been judged and a certain score put upon it, and the same butter retained to be tested for keeping quality, experiments completed, and others now in progress, show that an acid test is by far the better criterion as to the extent and rapidity of deterioration."

Pasteurization as a factor in making butter from cream skimmed on the farm, C. E. LEE (*Illinois Sta. Bul. 138, pp. 369–438*).—This is a study of the quality of butter made from pasteurized sour cream as compared with the quality of butter made from the same grade of cream not pasteurized.

The butter scored in 1905 gave an average of 0.7 of one point higher score in favor of butter made from pasteurized cream. After being in cold storage 4 months the butter from the unpasteurized cream decreased in quality 0.3, and that from the pasteurized 0.45, of one point. In 1906 butter made from unpasteurized cream scored on an average 0.5 of one point over that of the pasteurized. Twenty-six days later the same lot of butter was again scored by two judges, with an average of 0.97 and 0.27 of one point, respectively, in favor of the unpasteurized. After being in storage 101 days one judge decided that there was no difference in the decrease of quality, while the score of another judge showed that the butter from the pasteurized cream had decreased 0.71 of one point more than the butter from the unpasteurized.

"The 104 tubs of 1907 butter were scored by five judges 44 days after the first lot was made. According to three of these judges the unpasteurized butter scored higher by 0.56, 0.27 and 0.10 of one point respectively. The other two judges scored the pasteurized butter higher by 0.3 and 0.41 of one point. Following a period of four months in storage this butter was rescored by four of the former judges. According to three of them the unpasteurized decreased in quality 0.13, 0.72 and 0.04 of a point more than the pasteurized butter, while the fourth judge scored the unpasteurized butter higher by 0.34 of one point.

"The 1908 comparisons were represented by 160 tubs of butter shipped to both the Chicago and New York markets. The butter shipped to Chicago was scored by five different judges, 13 days after the last butter was made with the following average results: Two of the judges favored the pasteurized butter by 0.2 and 0.1 of one point respectively. After six to seven months in storage this same butter was rescored by four of these same judges. The butter made from the unpasteurized cream decreased to the extent of 0.15, 2.02, 0.25 and 0.65 of a point, respectively, more than did the butter made from the pasteurized cream.

"The butter that was shipped to New York was scored by one judge before it was placed in storage with the result of 0.1 of one point in favor of unpasteurized butter. According to this same judge the unpasteurized butter decreased in storage 0.35 of one point more than the pasteurized butter. The average of all the scores placed upon this butter after storage, by four judges, was 1.51 points in favor of the pasteurized butter."

From these comparisons the author concludes that pasteurization does not affect the body or texture of butter and does not improve the quality of butter made from sour farm-skimmed cream.

[Ozone for deodorizing stale cream in buttermaking] (*Pop. Electricity, 2 (1909), No. 8, pp. 515, 516, fig. 1; abs. in N. Y. Produce Rev. and Amer. Cream., 29 (1909), No. 7, pp. 270, 271*).—A brief account of a trial of a new method of using ozone for utilizing stale cream in the manufacture of "fresh" butter. The cream was first run through the pasteurizer at a temperature of 130° F., and from there carried into the agitator and treated with ozone for 40 minutes. At the end of this period the cream had been bleached and completely deodorized and the acidity had been reduced from 0.7 to 0.36 per cent. After cooling, the cream was churned into butter grading up to No. 1.

On the presence of colored macroscopic colonies of bacteria in Emmental cheese, J. Thöni and O. Allemann (*Centbl. Bakt.* [etc.], *2. Abt., 25 (1909), No. 1–4, pp. 8–30*).—Pure cultures were made of bacteria taken from minute colored spots of Emmental cheese. The black spots were found to be caused by *Bacterium güntheri*. The brown and red spots contained organisms closely related to proprionic acid bacteria and which were named *Bacterium acidi propionici* var. *fuscum* and *Bacterium acidi propionici* var. *rubrum*.

The disposal of wastes from the dairy industry, A. E. Kimberly (*Quart. Bul. Ohio Bd. Health, 1 (1909), No. 3, pp. 151–170, pls. 2; abs. in Engin. Rec., 61 (1910), No. 2, pp. 50, 51*).—After an inquiry into a number of nuisances caused by the improper disposal of wastes from the dairy plants, experiments were made on a small scale in treating different mixtures of skim milk and water in settling and dosing tanks followed by filtration. At a skimming station the total waste waters were passed in a series of 4 galvanized tanks. The data thus obtained were used as a basis for obtaining a larger experimental tank consisting of a settling tank, a dosing tank, siphon and 2 sand filters, which had sufficient capacity to handle all the wastes produced, amounting approximately to 4,500 gal. daily.

The results were successful from a practical standpoint, the nuisance from smell and the marked pollution of the small run near the plant, both of which features had formerly been very pronounced in the summer months, being overcome. From the strict scientific viewpoint the results were not so satisfactory, as the degree of purification was not so high as had been anticipated.

Details are given for constructing a plant to treat waste waters from a creamery operating a 1,000 lb. churn daily at a probable cost of $750. For very small plants, if the cooling and condenser waters were separated from the putrescent liquids, a nuisance could be abated in some cases by causing the wastes to be

received into a water-tight cistern holding 3 or 4 days' flow and from which the wastes could be pumped into a tank wagon and carried away to a suitable point of disposal.

This report deals only with wastes from butter and cheese factories. No definite conclusions were drawn as to the details of treatment of renovated butter factory wastes.

VETERINARY MEDICINE.

Text-book of veterinary medicine, J. LAW (*Ithaca, N. Y., 1906, vol. 4, 2. ed., rev. and enl., pp. 718; 1909, vol. 5, 2. ed., rev. and enl., pp. 621*).—These volumes have been revised and enlarged. Volume 4 takes up infectious diseases, sanitary science, and police measures, and volume 5, parasites, parasitisms, etc.

Regarding the value of the Van Gieson and the Romanowsky malarial stains for the detection of Coccidia, P. B. HADLEY (*Centbl. Bakt.* [etc.], *1. Abt., Orig., 52 (1909), No. 1, pp. 147–150*).—In this paper, which is No. 5 of the division of biology of the Rhode Island Station, the author describes the technique which he has used successfully in detecting by means of the Van Gieson and the Romanowsky malarial stains, certain stages of *Coccidium cuniculi* found in the cecum, liver, and intestines of turkeys, sparrows, the common fowl, and other wild and domestic birds.

On a new spirillum in Cercopithecus patas, A. THIROUX and W. DUFOUGERÉ (*Compt. Rend. Acad. Sci.* [*Paris*], *150 (1910), No. 2, pp. 132, 133*).—The authors have found in a monkey (*C. patas*), from Kayes, in the French Sudan, a spirochete which morphologically is much like *Spirochæta duttoni*. This spirochete, to which is given the name *S. pitheci*, is said to be the cause of a very grave disease.

Stock diseases carried by flies, A. THEILER (*Transvaal Agr. Jour., 8 (1909), No. 29, pp. 41–51*).—The present knowledge of the various species of trypanosomes occurring in South Africa, namely *Trypanosoma dimorphon, T. congolense, T. theileri*, and *T. evansi*, and the rôle of flies in their transmission, is here reviewed. But two of the several described species of Glossina (*G. morsitans* and *G. pallidipes*) are known to occur in South Africa.

"The conclusion to be drawn from the various observations and statements would, therefore, be that under certain conditions the presence of flies stands in a certain relation to game, in others that the fly does exist without the presence of game. This latter fact must find some explanation by accepting that the flies can live on other animals besides game, it having been established that the fly, being a pure bloodsucker, requires blood to live."

Sleeping sickness in Uganda: Duration of the infectivity of the Glossina palpalis after the removal of the lake-shore population, D. BRUCE ET AL. (*Proc. Roy. Soc.* [*London*], *Ser. B, 82 (1909), No. B 552, pp. 56–63*).—"It must be concluded that the *Glossina palpalis* on the uninhabited shores of Victoria Nyanza can retain their infectivity for a period of at least two years after the native population has been removed."

Notes concerning Trypanosoma dimorphon, with a few preliminary observations on the trypanosomiases of southern Rhodesia, L. E. W. BEVAN (*Vet. Jour., 66 (1910), No. 415, pp. 12–19, figs. 2*).—An account is given of preliminary observations of a disease of cattle in southern Rhodesia apparently due to *T. dimorphon*.

East Coast fever (*Agr. Jour. Cape Good Hope, 35 (1909), No. 5, pp. 571–577*).—This is a résumé of the steps which have been taken by the government for safeguarding Cape Colony against the introduction of East Coast fever from the adjoining colonies of Natal and the Transvaal.

Experimental research in dourine, with particular consideration as to the atoxyl treatment, UHLENHUTH and WOITHE (*Arb. K. Gsndhtsamt., 29 (1908), No. 2, pp. 403–451, figs. 3; abs. in Jour. Trop. Vet. Sci., 4 (1909), No. 3, p. 439*).—The authors conclude from the investigations here reported that it is not possible to prevent the onset of experimental dourine by the previous injection of atoxyl, though its administration is successful in preventing the disease in inoculated animals providing it is done immediately after infection. It may succeed in curing or freeing the animal from parasites during the course of the disease.

Horses and dogs can not take a sufficiency of atoxyl to completely kill all trypanosomes, but rabbits, rats, and mice can withstand comparatively large doses. The method of administering by unguent appears to be preferable to administration in solution.

A bibliography of 67 titles is appended.

Biliary fever or malignant jaundice of the dog (canine piroplasmosis), W. JOWETT (*Agr. Jour. Cape Good Hope, 35 (1909), Nos. 4, pp. 429–441; 5, pp. 582–584*).—The author reports in detail the results of injections with trypanblau of 13 experimentally and 6 naturally infected dogs. Except in the case of 2 dogs almost in extremis when received, the treatment proved to be an unqualified success.

"Six dogs infected experimentally with biliary fever (by injection of virulent blood), and subsequently treated with one injection of trypanblau, all recovered. Four dogs injected in like manner, but which did not receive drug treatment, all died. One experimentally infected dog in which the treatment was attempted by the administration of a dose of trypanblau by the mouth also succumbed. One dog infected experimentally and injected 3 days later subcutaneously with half dose of trypanblau before parasites had appeared in its blood remained well, as did also an animal which received a dose of trypanblau and 6 days later an injection of virulent blood. . . . Four dogs very ill and manifesting severe symptoms of biliary fever (red colored urine, anemia, yellow colored membranes, etc.), under treatment by injection of trypanblau all recovered."

One of the dogs which recovered resisted an inoculation of virulent blood and was evidently immune. Investigations of the action of trypanblau on heartwater of sheep and goats and South African redwater of cattle are stated to be under way.

Infectious jaundice due to Piroplasma commune, J. McI. PHILLIPS and E. F. MCCAMPBELL (*Centbl. Bakt. [etc.], 1. Abt., Orig., 47 (1908), No. 5, pp. 592–608, pl. 1, figs. 4, charts 2*).—This is a preliminary report of an epizootic of dogs at Columbus, Ohio, which is similar to that caused by *P. canis*.

By inoculation the disease was produced in guinea pigs and cats as well as dogs, but not in the horse, cow, rabbit, or rat. Although the disease is very virulent for guinea pigs when inoculated into the peritoneal cavity or subcutaneously, it is not in the least contagious. By means of Wright's modification of Jenner's stain, applied for a long period of time, the authors were able to demonstrate protozoan parasites within the erythrocytes of blood from guinea pigs. These organisms were found to be similar to *P. canis*, but since they differ from it in being pathogenic in other hosts than the dog, the name *P. commune* has been applied. "Two regular forms of the parasite have been noted so far, a round and a piroform or pear shape. The size varies in the round forms, which are more abundant, from 0.5 to 1.5 microns in diameter and in the pear shaped forms from 1.5 to 2 microns in width at the widest place and from 2 to 3 microns in length. There is great pleomorphism among the piroplasmata as in *P. canis* and *P. bigeminum*."

Preliminary transmission experiments indicate that *Uncinaria canis* may be an agent in the transmission of this infection. Fleas from jaundiced dogs placed on healthy dogs and allowed to remain for several weeks in a flea-proof cage produced no infection. Experiments with *Dermacentor occidentalis* gave negative results.

The treatment of redwater in cattle (bovine piroplasmosis) with trypanblau, S. STOCKMAN (*Jour. Compar. Path. and Ther., 22 (1909), No. 4, pp. 321–340*).—The author presents in tabular form the details of inoculations of 29 animals with *Piroplasma bigeminum*, and the effect of trypanblau, with which 20 were afterward injected.

It has been found that if blood from an animal more or less recently recovered from Texas fever be injected into a series of other animals that the reactions obtained in the latter may be most irregular. "Some of the animals after an incubative period of from 5 to 10 days may show nothing more than a slight rise of temperature, accompanied by the appearance of piroplasms in a small proportion of the red blood cells, others may become more or less ill and recover, and some may even die of the disease inoculated.

"During the last 3 years I have inoculated about 100 bovine animals with the virus of redwater, in most cases for the purpose of giving them some degree of immunity before they were shipped to colonies in which the pastures are infected with piroplasmosis, and I have found that the behavior of one group of animals towards a certain virus was seldom a good guide to what its effect might be on the next group submitted to the immunization process. In some of the groups there would be hardly one severe reaction, while in others the majority of the animals would suffer severely. . . . The reaction obtained with a special virus seems to depend to a great extent on the individual susceptibility of the animal operated upon—a factor the existence of which one can not initially even suspect. There are other factors, however, which appear to have some influence on the activity of a virus. . . . The death rate from inoculated piroplasmosis in bovines is not high, probably 5 per cent would be a high figure to put it at if a large number of animals are operated upon.

"The action of the drug is to confine the piroplasms for a time to the internal organs. It certainly does not appear to clear them completely out of the system, since they reappeared after an interval, as in the case of some of the untreated. . . . I think there can be no reason to doubt, however, that the blood of an animal treated with trypanblau retains its virulence and can infect ticks."

It is thought that trypanblau may aid in making the process of immunization more regularly mild. While the experiments here described support the conclusions of Nuttall and Hadwen (E. S. R., 22, p. 83), that trypanblau has a marked effect on the bovine piroplasma, it is concluded that the value of the treatment can be properly estimated only after extensive trials in the field.

Indian cattle in Jamaica, B. S. GOSSET (*Bul. Dept. Agr. Jamaica, n. ser., 1 (1909), No. 2, pp. 102–113, pls. 4*).—"Indian cattle are in a great measure immune from the attacks of the different species of ticks, which swarm in our pastures. I have noticed a great diminution of ticks in pastures which have been regularly fed by zebu cattle, and horses also thrive better when fed in the same pastures as Indian cattle. Ticks are frequently on the skins of zebus, but unless the animal is sick or is starved they do not seem to thrive, but appear rather to exist in an undeveloped state. Should the zebu be starved for a couple of days the ticks develop on its hide in a most astonishing way, though the animal may have been confined in a place where there were none. . . .

"The chief causes of loss by disease, are blackleg among the young stock, and splenic fever among the older ones. These diseases often take the very

finest and best of the growing cattle but splenic seldom attacks mature beasts, and only young animals are subject to blackleg."

Anti-rinderpest serum, its production and use, C. G. THOMSON (*Philippine Agr. Rev. [English Ed.], 2 (1909), No. 12, pp. 670–676, pls. 2*).—An account is given of the use of this serum, particularly in the Philippine Islands.

"Anti-rinderpest serum, properly prepared and kept, will protect over 90 per cent of treated animals, as shown by the results obtained during the past 2 years. In the fiscal year of 1907, a total of 16,495 animals were inoculated, with 269 reported deaths, a mortality of 1.6 per cent. In 1908, a total of 21,005 were treated, with a mortality of 621, or 2.95 per cent. It is improbable that all deaths following inoculation were reported."

Epizootic abortion in cattle, J. MCFADYEAN ET AL. (*Rpt. Dept. Com. Bd. Agr. and Fisheries [Gt. Brit.], Epizootic Abortion, 1909, pt. 1, pp. 24; App., pp. 43*).—This is the report of a committee appointed by the president of the Board of Agriculture and Fisheries to investigate contagious epizootic abortion among bovine animals. In the appendix, Drs. J. McFadyean and S. Stockman give a detailed account of the experiments and observations upon which the report is based. A historical review is first presented, followed by an account of the method of obtaining material and the post-mortem appearance of affected cows. The causative agent is then considered, its morphological, tinctorial, and cultural characteristics being described.

"If a suitably stained preparation made from the uterine exudate of an affected cow be examined under the microscope a large number of white blood corpuscles and catarrhal cells from the uterine mucous membrane can be seen. Between the cells there are numerous small single bacilli, which are mostly of an oval shape; some, however, are distinctly rod-shaped, like the tubercle bacillus, and show 1 or 2 unstained areas in their substance. In many places the bacilli are collected into dense groups or colonies. . . . As a rule the majority of the bacilli are between 1 and 2 microns in length, but many are less than 1 micron. The longest measure about 3 microns. The bacilli are nonmotile. . . . In no affected uterus while fresh were abortion bacilli found in the fluids contained inside the fetal membranes. In the fetus itself, however, they were frequently, though not always, found in the fluid contents of the stomach. . . . The abortion bacillus grows best at temperatures between 30 and 37° C. The bacillus is an aerobe.

"There seems no reason to doubt that the Danish and English diseases are one and the same, and we have not thought it necessary to coin a name for the bacillus, as it seems appropriate that it should be known as 'Bang's bacillus of cattle abortion' in deference to the work of its distinguished discoverer. . . . It was found that in the moist state it was not destroyed at a temperature of 55° maintained for an hour, but 2 hours at the same temperature proved fatal. If it be kept for 10 minutes in water at a temperature between 59 to 61° and above, its vitality is destroyed, but after exposure in water at 55° for 10 minutes it retains its vitality.

"The contents of the infected uterus, that is to say, the exudate, the fetal membranes, and the fetus, are all virulent, since they contain the microbe. It is improbable that abortion bacilli are excreted in the milk of affected cows, and some experimental observations which were made show that the bacilli can not be found in the milk a week after a large amount of culture has been injected up the teat. . . . It appears that virulent material may, if kept fluid and free from putrefaction, remain infective for 7 months but not for a year. . . . Desiccation has a destructive influence on the vitality of the virus. . . .

"Affected in-calf cows may be introduced into a clean herd, and be the means of establishing fresh centers when they abort. This is one of the most

insidious ways in which abortion may be spread, for it is impossible for the ordinary individual to say whether a pregnant animal is affected or not. . . . Cows which have aborted must be considered sources of infection so long as the discharge continues to come from the genital organs, and it may continue intermittently for a few weeks if the animals be not treated. Such animals, if not isolated, may continue to infect the sheds, or the pastures when turned out to graze. . . . The most certain method of infecting an animal with abortion is to inject natural virulent material or active cultures into the blood stream." In experiments this method of infection gave positive results in 8 cases and failed in none.

"Animals can also be infected by the subcutaneous inoculation of considerable quantities of virulent material. . . . Out of 5 attempts to experimentally infect animals by this method 3 were positive, and 2 were negative. We consider that this method of infection must be looked upon as an artificial one, and we do not think it probable that under natural conditions animals are at all likely to be infected by virulent material gaining access to a wound." By introducing virulent material per vaginum 5 positive and 3 negative results were obtained. In ingestion experiments "3 positive results were obtained against 1 negative. We do not think it would be warrantable on this comparatively small number of experiments alone to conclude that infection is more likely to follow when virulent material is swallowed than when it is introduced by the vagina." . . . The authors, however, are inclined to believe that the disease is more frequently contracted by ingestion than in any other way. "Presumably, the bacilli are absorbed from the intestine and gain the blood stream, whereby they reach the uterus. . . . In the experimental attempts to infect with natural virus by way of the vagina, 3 were followed by positive results and 3 by negative, in spite of the fact that the material was deposited in enormous quantity right on and around the os uteri by means of a long tube."

The symptoms are briefly considered. Under the headings of distribution and identity of the disease it is stated that the disease is very prevalent throughout Great Britain. "Abortion was experimentally induced by introducing the microbe of cattle abortion into the bodies of cows, ewes, goats, bitches, and guinea pigs. . . . We are of the opinion that bovine abortion . . . is essentially a disease of cattle, and although other species can be experimentally infected in the laboratory they are not likely to contract the disease in practice except as the result of gross carelessness in the disposal of infected material. . . .

"It is an easy matter to identify the characteristic clumps of abortion bacilli in microscopical preparations made from the uterine exudate discharged immediately before and after abortion. . . . No evidence has been obtained during the investigation to show that natural immunity to the abortion bacillus is possessed by any individuals of the bovine species. . . . From general inquiry, we are inclined to believe that a majority at least acquire a serviceable degree of immunity as the result of an attack, but there is no doubt that in practice a considerable proportion abort twice and a small number abort even three times. . . . From the first it appeared that the disease was not one against which a protective serum could be successfully used. The protection derivable even from a potent serum can not be depended upon to last more than 2 or 3 weeks. . . . Moreover, as curative agents in advanced stages of disease, sera, as a rule, have little or no value."

An experimental test of carbolic acid administered internally gave negative results. Treatment with dead bacilli appears to have failed in 1 case and to have succeeded in 2. It appears that the methods which have been relied upon in the past for the prevention of abortion and its eradication from a herd have not brought about any material improvement in the general condition of the

herds. "According to reports, decided improvements have been effected in individual herds by the adoption of isolation and disinfection, while in others very little has been accomplished. Should the fixation of the complement and abortin tests justify in actual practice the hopes raised by their application in the laboratory, they will not only constitute additional means of establishing the diagnosis after the act, but will furnish a method of diagnosing the disease a considerable time before the uterus has ejected its virulent contents, and so give to measures of isolation their full and undoubted value in practice." It is stated that the internal administration of carbolic acid must be regarded as an absurdity which has gained a certain amount of support owing to observations carelessly collated and carelessly interpreted. "So long as a discharge continues to come from the genital passages, we think that for hygienic and therapeutic reasons they ought to be cleansed once or twice daily by the intravaginal injection of tepid antiseptic solutions, such as a 2 per cent solution of carbolic acid or a 1 in 3,000 solution of corrosive sublimate, but not on the ground that the injections will disinfect the uterus."

It is shown that the bovine female can be rendered highly resistant to infection with virulent material by the subcutaneous injection of a comparatively large quantity of active liquid culture of the abortion bacillus, the inoculation to be performed about 2 months before the commencement of pregnancy. While "it is not possible to immunize pregnant animals with living cultures, it is possible, however, that a not inconsiderable degree of immunity of shorter duration may with safety be bestowed on pregnant animals by inoculating them with a large dose of bacilli which have been killed at a low temperature."

On contagious abortion in cattle, S. STOCKMAN (*Vet. Rec., 22 (1909), No. 1102, pp. 134–139*).—An address presented before the Royal Counties Veterinary Medical Association, held July 30, 1909.

The Bang method for the repression of tuberculosis in cattle, B. BANG (*Penn. Dept. Agr. Bul. 172, pp. 28*).—An account of the operation of the method originated by the author, which was introduced into Denmark in 1892.

Abscesses in the lungs and lymphatic glands of sheep, W. JOWETT (*Agr. Jour. Cape Good Hope, 35 (1909), No. 6, pp. 733–735*).—Caseous lymphadenitis due to the bacillus of Preisz-Nocard is reported to be prevalent in Cape Colony.

Studies of agglutination reactions in hog cholera during the process of serum production, W. GILTNER (*Michigan Sta. Tech. Bul. 3, pp. 5–21*).—In the investigation here reported the author finds that the blood serum of normal hogs may agglutinate *Bacillus choleræ suis* in dilutions as high as 1 : 125, of virus hogs as high as 1 : 700, of immune pigs as high as 1 : 1,000, and of hyperimmune pigs as high as 1 : 2,000 and possibly higher.

"Pigs may be killed by injection intravenously or by feeding cultures of *B. choleræ suis* isolated from virus hogs made sick by intramuscular injections of hog-cholera blood. Pigs immunized according to the Turner-Kolle method may withstand intravenous injections of virulent cultures of *B. choleræ suis*. . . .

"We have demonstrated that the hyperimmunization process of Dorset-Niles results in the production of agglutinins and immune bodies for *B. choleræ suis*. We know neither the nature of these immune bodies nor the constancy with which they occur. It is not determined by our experience whether the production of immune bodies for *B. choleræ suis* is the only result, that is, the primary result, of the hyperimmunization process or merely a secondary reaction, incidental to the primary production of immunizing substances against the filterable virus. Our experiments are valuable in paving the way for a clearer understanding of the etiology of hog cholera. Until the etiology of hog cholera is determined by uncontrovertible experimental and clinical evidences, the pro-

duction of immunity toward hog cholera must remain a matter of uncertainty, constantly subjected to the interrupting influences of unknown factors. If *B. choleræ suis* is a species distinct from the filterable virus of Dorset and others, then there is truly opened a wonderful field in bacteriology as related to animal pathology, involving the associative action, the symbiotic relations of several pathogens and the common host."

Infectious pneumonia of the horse, F. G. EDWARDS (*Vet. Rec., 22 (1910), No. 1122, pp. 463–467*).—A general account is given of this disease which has been known in Europe for some time, particularly in France, Germany, and Russia, where it is both epidemic and endemic. Within the last 2 years, several large and valuable hunting, racing, and breeding studs in England have been affected.

Ensilage poisoning in horses, L. C. BEAUMONT (*Mo. Valley Vet. Bul., 4 (1909), No. 7, pp. 30–32*).—Several cases are reported in which horses were poisoned through being fed moldy ensilage. Cattle fed on ensilage from the same source were not affected.

Sulphur poisoning in horses, H. W. PERCY (*Vet. Jour., 66 (1910), No. 415, pp. 29–31*).—An account of poisoning of horses by sulphur. The author considers sulphur very poisonous if given in quantities larger than 8 oz.

Vaccine therapy and the treatment of follicular mange, A. E. METTAM (*Vet. Jour., 66 (1910), No. 415, pp. 33–37; Vet. Rec., 22 (1909), No. 1118, pp. 390, 391*).—Having concluded from observations that the demodices were not the chief cause of lesions and that possibly staphylococci might be, experiments with *Staphylococcus pyogenes albus* were conducted. Cultures grown upon agar were washed off with physiological salt solution and sterilized at a temperature of 56° C. for 1 hour. Injections of the staphylococci are said to have resulted in the recovery of the affected dog.

A new view of the pathology of rabies, D. KONRADI (*Orvosi Hetilap, 52 (1908), No. 31, pp. 571–573; abs. in Vet. Rec., 21 (1909), No. 1080, p. 630*).—The author states that he has conducted experimental investigations which prove that the virus of rabies is transmitted from the mother to the fetus. It is, however, transmitted in an attenuated condition, and for this reason, further inoculations of other animals show a progressive lengthening of the period of incubation.

He was able to demonstrate the virus of rabies in young animals born during the period of incubation of the disease in the mother, when the mother's disease remained latent for 9 days after the birth of the offspring. Thus the virus was circulating in the maternal blood and affected the young by the placental circulation 9 days before the appearance of fever, the first manifest symptoms of experimental rabies, in the mother.

From these results it appears that the bite of a dog can be dangerous from 6 to 8 or even 13 days before the appearance of symptoms characteristic of rabies.

Nodular tæniasis, or tapeworm disease, of fowls, G. E. GAGE and C. L. OPPERMAN (*Maryland Sta. Bul. 139, pp. 73–85, figs. 4*).—This bulletin gives an account of the life history of the parasite and of the treatment which was found most effective, and records observations of the outward symptoms and post-mortem findings of 14 affected fowls examined during an outbreak at the Maryland Station and the surrounding country in 1908. Nodules were found along the outside walls of the intestinal tract with tapeworms attached at each nodular spot, within the intestines. Two worms were isolated from infected birds and identified as *Drepidotænia infundibuliformis* and *Davainia (Tænia) tetragona*.

It is advised that affected birds should be isolated and kept confined until they have recovered. Droppings of all birds known to be infested with the parasites should be destroyed, or if used for fertilizer treated with a disinfectant.

In treating affected fowls the authors gave large doses of Epsom salts, the object being to eliminate the egg-bearing proglottides from the intestinal tract as quickly as possible. Turpentine was then administered with the result that all the birds which were treated were saved.

Experiments conducted to determine the dose of salts necessary are reported in tabular form. For birds 1 to 5 weeks old, 10 grains are recommended; from 5 to 10 weeks, 15 grains; and from 10 to 15 weeks, 20 grains; from 15 weeks to 6 months, 30 grains; from 6 months to 1 year, 35 grains; and for adult fowls 40 to 50 grains. Up to 15 weeks, the salts should be given in the feed, after this with 2 teaspoonfuls of water. In administering turpentine, from 2 teaspoonfuls to ½ oz. of which may be given, the liquid can be introduced directly into the crop by means of a soft rubber tube or catheter. By this method the turpentine passes immediately into the intestines and destroys the heads of the worms left behind after the purgative has torn away the long ribbon-like band of segments of the parasite.

Formaldehyde disinfection without special apparatus, L. E. WALBUM (*Hospitalstid. [Copenhagen], 52 (1909), No. 31, pp. 961–974; abs. in Jour. Amer. Med. Assoc., 53 (1909), No. 14, p. 1144*).—The author reports a series of comparative tests of various methods of formaldehyde disinfection.

The most effective and cheapest is with the special disinfecting formaldehyde apparatus, but good results can be obtained with potassium permanganate-formaldehyde, though larger amounts of the chemicals must be used than the directions call for. It was found to be impossible to obtain satisfactory results until the amounts were increased to 3.3 kg. potassium permanganate, 3.3 liters formalin, and 3.3 liters of water for each 100 cubic meters.

RURAL ENGINEERING.

Irrigation in Texas, J. C. NAGLE (*U. S. Dept. Agr., Office Expt. Stas. Bul. 222, pp. 92, pl. 1*).—This is another of the series of reports giving the status of irrigation in the several arid States, with special reference to the data likely to be needed by prospective settlers. It discusses the physical features, climate, and natural resources of the State, and gives a brief description of the larger irrigation projects now in operation there. It also contains a summary of the laws of the State governing irrigation.

The area at present irrigated in the State is estimated as 400,000 to 500,000 acres. No estimate of the area which can ultimately be irrigated is given, because of the fact that a large part of the State has sufficient rainfall to produce crops so that irrigation in these sections is optional with the farmers.

Progress report on experiments in supplemental irrigation with small water supplies at Cheyenne and Newcastle, Wyoming, 1905–1908, O. W. BRYANT (*U. S. Dept. Agr., Office Expt. Stas. Circ. 92, pp. 51, figs. 8*).—The greater part of the land lying between the one hundredth meridian on the east and the Rocky Mountains on the west is beyond the reach of canals from the streams of that section, and the water supply is not sufficient to irrigate any considerable part of it. Consequently the agriculture of this region must be principally such as can be carried on without irrigation. Notwithstanding previous failures to establish permanent homes there, these lands have been taken up very rapidly within the last few years, and the work reported in this circular was undertaken for the purpose of demonstrating to the incoming

settlers the possibilities of developing a water supply for the irrigation of a small part of each landholding and the great advantages to be gained from its use. Although the years covered by this report have had precipitation far above the normal, irrigated crops have been far superior to crops grown without irrigation, and in addition the irrigated plats have yielded crops every season, while the unirrigated land has yielded crops no oftener than every other year, and those crops were usually light.

Farm underdrainage: Does it pay? W. H. DAY (*Ontario Dept. Agr. Bul. 174, pp. 24, figs. 16*).—Millions of acres in Ontario are so wet that seeding is delayed from 2 to 6 weeks. Wood pipes formerly used have decayed and stone ones have filled up, leaving the land in need of drainage.

Letters from those for whom the college department of physics had surveyed drains indicate that half of the correspondents were able to sow their drained lands 4 weeks or more earlier than undrained land, while nearly two-thirds of them gained 3 weeks or more. The cost of drainage was frequently repaid before the end of the first or second season in the increased yields of hay, straw, grains, and peas. The average increased yields due to drainage were 25 bu. per acre in case of barley, 43 of oats, 10 of peas, 23 of fall wheat, 10 of spring wheat, 20 of corn, 35 of beans and $\frac{3}{4}$ of a ton of hay, while the yield of straw was reported as about doubled. At market prices in Guelph and Toronto, the average gain per acre is computed at $21.65.

Underdrainage is discussed in full as an investment and in its relation to the tillage, aeration and temperature of the soil, as well as to its effect upon bacterial action, the germination of seeds and development of the roots of the various field crops and of trees.

A portable panel fence, W. DIETRICH (*Illinois Sta. Circ. 132, pp. 4, fig. 1*).—This describes in detail a method of constructing a portable fence, planned primarily for swine but which may also be used for sheep and calves. The fence consists of panels and triangles made of rough fence boards 6 in. wide. The panels are 16 ft. long and make a fence 40 in. high when the lower boards of the panels rest on the ground.

Sanitary cow stalls, C. A. OCOCK (*Wisconsin Sta. Bul. 185, pp. 3–18, figs. 9*).—Several types of homemade sanitary cow stalls are illustrated and described. The Model stalls can be built for about $6 each. The principal features are (1) the movable crossbar near the hind feet of the cow which causes her to move forward, and (2) a hay rack in front which compels the cow to stand at the rear of the stall when eating. The Helendale stall, which has swinging partitions, a crossbar front, and a chain in the rear, costs about $5.75. The Ideal stall differs from the Model in having no hay rack in front and in allowing more freedom to the animal by means of the chain arrangement. It costs about $4.40. The New Ideal costs about $7.18 and is much like the Ideal but is made of gas pipes, except the manger and partitions. Details are also given regarding the construction of concrete stable floors and mangers.

Electricity and agriculture, W. H. P. CHERRY (*Dept. Agr. N. S. Wales, Farmers' Bul. 18, pp. 26, figs. 24*).—This article deals with the application of electricity in the manufacture of nitrogen compounds, in electro-culture, and various household and farm operations. See also a previous note (E. S. R., 20, p. 688).

Refrigeration on the homestead, H. V. JACKSON and A. E. LEA (*Dept. Agr. N. S. Wales, Farmers' Bul. 11, 2. ed., pp. 16, pl. 1, figs. 9*).—The problem of farm refrigeration is discussed and data are given regarding machinery of different makes, with special reference to conditions relating to small refrigerating plants. Information is summarized and discussed regarding farm

products, both animal and vegetable, and the advantages of a wider application of cold storage are pointed out under the conditions considered.

"In New South Wales there is great scope for the further development of the frozen pork, ham, and bacon industry, and the comparative cheapness of refrigerating plants for the small as well as the large factory, places refrigeration within the scope of operations of small cooperative societies.

"In like manner, if the fisheries of the State are to be more fully developed and thoroughly worked along our coast line, then refrigeration will be a factor assisting in the development of small fishing communities which may yet be established at various points. . . .

"In the absence of other methods, the storing of maize and other grain and seed in cold stores is also an excellent means of holding over seed required for special purposes."

Transactions of the American Society of Agricultural Engineers (*Trans. Amer. Soc. Agr. Engin., 1 (1907), No. 1, pp. 102*).—This contains the proceedings of the first meeting of this society, held at Madison, Wis., December 27 and 28, 1907, and previously noted (E. S. R., 19, p. 596).

RURAL ECONOMICS.

The training of farmers, L. H. Bailey (*New York, 1909, pp. VIII+263*).—This book is a compilation of articles written as separate studies made at long intervals of time, with some new matter, the aim being to present a homogeneous study of the one phase of the rural problem which has to do with the means now in existence for the educational, scientific, and practical training of farmers.

Farm bookkeeping, H. G. Lamb (*New York, 1908, pp. VIII+69*).—This is a practical book of instruction for farmers and their wives which aims to make the double-entry system of bookkeeping perfectly clear and simple by means of definitions, explanations, and diagrammatic accountings.

Simplified farm accounts, Hattie M. Wilson (*Farmer, 28 (1910), No. 1, pp. 4, 12, figs. 4*).—A method of keeping farm accounts adapted to both live stock and field crop records is illustrated and described.

The needs and importance of agriculture and relations of farming interests to the railroads, W. W. Finley (*Tradesman, 62 (1909), No. 25, pp. 39–42*).—This is an address delivered by the president of the Southern Railway at a meeting of farmers in Salisbury, N. C.

The paper deals with the opportunities afforded by the South for the increased production not only of staple products like cotton and corn, but also for dairy farming, poultry raising, and the culture of fruits and vegetables. Increased products, however, would require an increase in marketing facilities, and therefore good roads, efficient railroad service, and improved waterways are necessary to the highest welfare of the farmer, particularly with reference to the profitable disposal of perishable products.

As far as the South is concerned, the farmers and the railroads are mutually dependent for their highest economic welfare.

[The transportation of agricultural packages], D. Bellet (*Écon. Franç., 38 (1910), I, No. 2, pp. 45–47*).—This article describes the rates charged, sizes of packages, kind of goods carried, and obligations assumed by various British railways for the transportation of small packages of perishable farm products, together with an account of the introduction and operation of a similar system in France.

The French system of imposing a stamp tax on such packages nets the government 35 centimes out of every 85 centimes charged the sender for carrying

the produce, and this article strongly emphasizes the economic differences existing in the two countries in the transportation of perishable farm products and of the greater burden under which the French small holder naturally labors as a result of this policy. A reduction in the stamp duty on agricultural products shipped in small packages for short distances is recommended.

Farmers' shipping associations (*West. Fruit Grower, Brother Jonathan Ser. 11, pp. 38*).—This pamphlet gives an account of the origin, development, and work of several fruit and vegetable growing associations, together with copies of their constitutions and by-laws. The information is presented with a view to furnishing suggestions to growers for solving the problems connected with the marketing of such perishable farm products.

[Papers on agricultural cooperation] (*Cornell Countryman, 7 (1909), No. 2, pp. 41–48, figs. 5*).—A series of articles dealing with cooperative marketing of truck crops, fruits, and poultry products, and the function of the grange in cooperation.

Cooperative marketing, W. H. Reid (pp. 41–43).—An account of the organization and work of the Monmouth County Farmers' Exchange of New Jersey for the cooperative marketing of vegetables and the purchase of supplies. The society has been organized one year, has 525 members, sold goods valued at $454,414.11, purchased $35,000 worth of seed potatoes and 859 tons of fertilizers for members, and increased its receipts about 12 per cent. Brief notes are also given on the present financial status of the Eastern Shore Produce Exchange, Onley, Va.

The grange as a factor in cooperation, W. N. Giles (pp. 43, 44).—This article shows that one of the fundamental principles of the grange is to encourage business cooperation among its members, with the result that members have consolidated their products into jobbing quantities and purchased products in quantities insuring substantial reductions in cost.

The Hood River Apple Growers' Union, C. C. Vincent (pp. 45–47).—An account of the origin and development of this society, its methods of grading, packing, and marketing apples, and the advantages to farmers of such organizations in all branches of agriculture.

Cooperation in marketing poultry products, G. Frost (pp. 47, 48).—Notes are given in this article on the origin and work of the Central New York Egg and Poultry Shippers' Association in 1909 in the marketing of eggs and poultry.

Agricultural credit, insurance, and cooperative societies in France, L. von Hennet (*Mitt. Fachberichterstat. K. K. Ackerb. Min. [Vienna], 1909, No. 18, pp. 137–141*).—The data in this article have been noted from another source (E. S. R., 22, p. 194).

State aid to agricultural cooperation in France (*Dept. Agr. and Tech. Instr. Ireland Jour., 10 (1909), No. 1, pp. 72–79*).—Statistics on the development of agricultural professional associations, credit banks, insurance societies, and cooperative societies in France are discussed, and the forms under which the government assists and encourages agricultural cooperation are summarized as follows:

"Exemption, in the case of agricultural cooperative societies of various kinds, from the troublesome and expensive formalities required by law in the formation of ordinary companies and associations.

"Exemption from certain stamp duties, patent fees and taxes on transferable securities, in the case of cooperative agricultural credit banks, insurance societies, etc.

"Grants are made (*a*) to new cooperative agricultural insurance societies on their formation, and (*b*) in times of stress to such societies already at work.

"Free loans are made (*a*) for a period of five years to cooperative district credit banks (law of 1899), and (*b*) for a term up to 25 years to agricultural cooperative societies (law of 1906).

"Under the law of 30th April, 1906, relative to the system of 'warrants agricoles,' agricultural cooperative societies may obtain loans on the security of any agricultural produce in their possession, provided there be nothing against this in their statutes."

The Belgian farmers' union, P. VAN MOLKOT (*Rev. Gén. Agron., n. ser., 4 (1909), No. 10, pp. 413–424*).—This article describes the deplorable condition of agriculture and the peasant class in Belgium before 1890, which conditions were the chief cause of the formation of the farmers' union (*Boerenbond*), and discusses in detail its origin, development, organization, and activities.

The union is a federation of farmers' societies originally organized for religious purposes, but which became centers for the spread of ideas relating to cooperation as a means of improving agricultural conditions. Its growth since 1890 has been unequalled in Europe. At present it includes about 480 societies with 41,000 members, and it operates under sections dealing respectively with the purchase and sale of products, agricultural credit, various forms of insurance, inspection service, and other cooperative features. In 1908 the section for purchasing farm supplies bought 28,349,043 kg. of fertilizers and 34,126,072 kg. of feeding stuffs for members. Of 586 local credit banks in Belgium at the close of 1908, 286 were affiliated with the central credit bank of Louvain which is under the control of the union.

While the author calls attention to the various criticisms brought against the union, he maintains that it has performed indisputable economic services to agriculture in Belgium. It has contributed largely to the uplift of agriculture, stopped the agricultural crisis, developed agricultural education, introduced modern cultural methods, and improved the welfare of large numbers of rural families.

Cooperative producing and credit societies (*Off. Gouvt. Gén. Algérie Bul. Bimens., 15 (1909), No. 24, pp. 371, 372*).—The text of the regulations under which cooperative societies in Algeria can secure long-time loans from the district banks in accordance with the provisions of the law of February 26, 1909, is reported.

Report on the working of cooperative credit societies in the Punjab for the year ending June 30, 1909, A. LANGLEY (*Rpt. Work. Coop. Credit Soc. Punjab, 1909, pp. 20+VII*).—The rural banks numbered 311 with 22,976 members, and possessed a balance of assets over liabilities of 94,313 rupees (about $30,000), representing large increases over the preceding year (E. S. R., 20, p. 1092).

A short history of English agriculture, W. H. R. CURTLER (*Oxford, 1909, pp. VIII+371*).—This volume gives an account of the whole period of English agriculture, but with more particular emphasis laid on the period from the beginning of the seventeenth century to 1908, inclusive.

Rural settlements in England, L. VON HENNET (*Mitt. Fachberichterstat. K. K. Ackerb. Min. [Vienna], 1909, No. 18, pp. 141–144*).—Statistics on the operation of the small holdings and allotments act during 1908, previously noted from another source (E. S. R., 22, p. 90), are presented and discussed.

Report for the year 1908 on the Russian budget. Expenditure necessitated by agricultural distress, H. O'BEIRNE (*Diplo. and Cons. Rpts. [London], Ann. Ser., 1908, No. 4163, pp. 17*).—In this report on the income and expenditures of the Russian Government for 1908 as compared with the preceding year, an account is given of the increasing government aid to agriculture since 1871 as a result of rural conditions.

For the decade 1871–1880 the average annual relief amounted to £180,000 and in 1881–1890 it fell to an average of £100,000 per year; "but in the period 1891–1900 it increased to £2,000,000, and in the years 1901–1906, inclusive, it was no less than £4,800,000 per year." The districts suffering most are within the rich black-earth zone of south, central, and southeastern Russia where the population is purely agricultural with no industrial centers to relieve the situation. The growth of distress is attributed to two principal causes—the insufficient area of peasants' allotments and inferior farming. A sum of £2,521,474 was expended in 1908 for the purpose of relieving congestion by facilitating the migration of peasants to Siberia, and there are also assignments towards the reorganization of the system of land tenure and the redistribution and improvement of holdings.

Agricultural wages and the supply of agricultural laborers in Finland, 1907, O. Groundstroem (*Landtbr. Styr. Meddel., 1909, No. 63, pp. 33+29*).—A statistical study. The supply of laborers was reported sufficient in the case of 42.8 per cent of the municipalities, while 56.8 per cent reported a "scant supply" or "great lack" of agricultural laborers, either during the entire year or during the summer season.

Our census of American agriculture (*Orange Judd Farmer, 48 (1910), No. 1, pp. 4, 5, figs. 2*).—Estimates on the number and value of farms, the value of farm products in 1909, and the farm wealth of the United States on January 1, 1910, are reported and discussed. The value of farms and farm property is given as $29,640,000,000, a gain of 44 per cent since the census of 1900.

Imports of farm products into the United States, 1851–1908 (*U. S. Dept. Agr., Bur. Statis. Bul. 74, pp. 62*).—Statistics on the quantity, value, and kinds of farm products imported into the United States, including the principal countries from which consigned, for a period of 58 years are reported and discussed.

Exports of farm products from the United States, 1851–1908 (*U. S. Dept. Agr., Bur. Statis. Bul. 75, pp. 66*).—Data similar in scope to the above dealing with the exports of farm products and the countries to which consigned are presented.

Crop Reporter (*U. S. Dept. Agr., Bur. Statis. Crop Reporter, 12 (1910), No. 2, pp. 9–16, figs. 7*).—Statistics on the number, price, and value of farm animals in the United States and foreign countries, the imports and exports of animals and animal products in 1908 and 1909, and the range of prices of agricultural products in the principal markets are reported, together with articles on the stock of potatoes on hand January 1, 1910, the value of land and the rate of wages in Canada, the crops of Austria-Hungary, and the prospective census of dairy and poultry products.

AGRICULTURAL EDUCATION.

Education for efficiency, E. Davenport (*Boston, 1909, pp. V+184*).—A collection of addresses by the author, with an introduction and some new connecting matter.

Part 1 deals with the general relations of agriculture to other subjects of education, and part 2 with practical methods of introducing agricultural study into existing schools. The author argues for vocational education, urges that "it is dangerous to attempt to educate a live boy with no reference to the vocational," and that no individual should "be obliged to choose between an education without a vocation and a vocation without an education."

"I would have it so that in any company of American citizens one can not tell by the dress, the manners, or the speech, what is the occupation of the

individual. To this end let there be few schools with many courses, not many schools with few courses." Agriculture is held to be a subject for both the college and the high school.

Vocational education (*N. Y. Ed. Dept., Dir. Trades Schools* [*Circ.*], *1910, Feb. 1, pp. 26*).—The author of this report discusses, among other general phases of vocational instruction, the importance of industrial arts in rural communities and household arts instruction. He particularly points out the desirability of devising new forms of manual training for country boys directly related to their vocational interests, and the importance of giving older girls in the schools work on real garments and cooking problems.

The nature-study idea, L. H. BAILEY (*New York, 1909, pp. IX+246, figs. 2*).—Part 1 of this book deals with the general content of "nature study," part 2 with the teacher's point of view, and part 3 with answers to various questions that have come to the author from teachers. Among the interesting special topics that receive attention are the following: Nature-study agriculture, must a "use" be found for everything, what subjects to choose, what is thoroughness of teaching, how choose the best books, shall there be a special nature-study teacher, how correlate nature-study work with other subjects, and is nature study on the wane.

Boys' and girls' agricultural clubs, F. W. HOWE (*U. S. Dept. Agr., Farmers' Bul. 385, pp. 23, figs. 11*).—This reviews the work already accomplished by boys' and girls' agricultural and domestic science clubs in the United States, the assistance given by this Department, and the relation of such work to rural schools, and offers practical suggestions for the organization of such clubs and the planning of their work. There is also included a list of the free publications of this Department and of various state colleges and experiment stations dealing directly or indirectly with this form of school extension work and related subjects.

Outlines of agriculture for rural schools, C. M. EVANS (*Chicago, 1910, pp. 31, figs. 5*).—This is a series of 37 outline lessons on agricultural topics adapted to Iowa conditions. The aim of the course is to relieve the teacher unfamiliar with agriculture from undue effort or anxiety by putting the responsibility for facts upon parents, direct observation by pupils, and the study of bulletins of information issued by the State and by this Department. No text-book is recommended, on the ground that "most teachers are not prepared to teach agriculture from a text-book."

Elementary domestic science, SARAH W. LANDES (*Guthrie, Okla., 1909, pp. 149*).—This is a text-book on food and cookery for schools. Part 1 deals with food, part 2 with cookery, and part 3 with directions for elementary chemical and physical experiments with food materials. It is so designed that each part may be used alone in schools not equipped for illustrating the entire subject. A useful list of reference books and bulletins is included. The treatment is well adapted to correlation with other school subjects.

Poultry pathology: Its place in the curriculum, G. B. MORSE (*Ontario Agr. Col. Rev., 22 (1910), No. 5, pp. 246–251*).—This paper points out the economic importance of a knowledge of poultry diseases and their proper treatment in successful poultry raising. The author regards this topic as of primary value in the arrangement of a course in poultry husbandry, and believes that the study of a well-organized poultry course would secure "a broad training involving not only a fundamental general science course but also a technical agricultural course that would include every phase of farm life."

The silo, J. F. WOODHULL (*Nature-Study Rev., 6 (1910), No. 1, pp. 10–16, figs. 2*).—This is a treatment of the subject adapted for presentation as a school topic in nature study, including a description in simple language of the

process of ensiling corn and an explanation of the chemical changes that take place in silage.

Organization lists of the agricultural colleges and experiment stations in the United States, Mary A. Agnew (*U. S. Dept. Agr., Office Expt. Stas. Bul. 224, pp. 93*).

Organization, work, and publications of the Agricultural Education Service (*U. S. Dept. Agr., Office Expt. Stas. Circ. 93, pp. 15*).—This circular outlines the nature of the educational work of this Department as conducted through this Office, the legal basis for this work, its subdivisions and staffs, and includes a descriptive list of the publications which have been issued by this Office on collegiate, secondary and elementary agricultural instruction, farmers' institutes, and extension work.

A teacher's professional library: Classified list of one hundred titles (*Bur. of Ed. [U. S.] Bul. 8, 1909, pp. 14*).—The books listed, classified partly by subjects and partly by grades of instruction, deal mainly with the history and theory of education, the school curriculum, and school organization and administration.

MISCELLANEOUS.

Experiment Station Work, LV (*U. S. Dept. Agr., Farmers' Bul. 384, pp. 32, figs. 3*).—This number contains articles on the following subjects: Poultry manure, early onions in the Southwest, oleander poisoning of live stock, feeding fermented cotton-seed meal to hogs, wintering farm work horses, alfalfa meal as a feeding stuff, mangels for milch cows, records of dairy herds, skim-milk buttermilk, whipped cream, farm butter making, Camembert cheese making in the United States, and cement and concrete fence posts.

List of periodicals currently received in the Library of the U. S. Department of Agriculture (*U. S. Dept. Agr., Library Bul. 75, pp. 72*).—This list, which contains 1,575 titles, arranged both alphabetically and classified by subjects, "does not include annual reports and other serial publications appearing as annual volumes, nor does it include series of bulletins, each number of which is a monograph, such as the publications of the state experiment stations. The aim has been to include only those serials which appear frequently and which are usually considered as periodicals."

Laws of Maine relating to agriculture (*Bul. [Maine] Dept. Agr., 8 (1909), No. 4, pp. 171–238*).—This is a compilation of the principal laws of the State relating to agriculture, arranged by subjects and with a detailed index.

Laws relating to agriculture now in force in Oklahoma (*Quart. Rpt. Okla. Bd. Agr. 1909, June 30, pp. 120*).—This is a digest of the laws pertaining to agriculture now in force in Oklahoma.

Laws of Vermont relating to agriculture and forestry (*Ann. Rpt. Comr. Agr. Vt., 1 (1909), pp. 10–38*).—This is a compilation of the laws of Vermont relating to agriculture and forestry.

Illustrated dictionary of agriculture (*Illustriertes Landwirtschafts-Lexikon. Berlin, 1910, 4. ed., pp. IV+987, figs. 60+1250*).—This contains definitions of agricultural terms, brief descriptions and in many cases illustrations of practices pertaining to agriculture, brief biographical notes of teachers, investigators, and others notable in agricultural work, and similar data.

NOTES.

Alaska Stations.—A. J. Wilkus, a graduate of the school of agriculture of the University of Minnesota, has been appointed assistant at the Sitka Station, vice R. W. De Armond, resigned, and has entered upon his duties.

Arkansas Station.—W. C. Lassetter, assistant in soil physics at Ohio State University, has been appointed assistant agronomist in the station and has entered upon his duties.

Georgia College.—Fourteen extension schools of agriculture have been held during the last eight weeks. Unusual interest has been manifested, the average registration per meeting being over 90, and the attendance at the 91 sessions held thus far 8,220. Petitions are being received asking for meetings far in excess of what the appropriation will allow. A campaign is now being organized for institute work. The county school commissioners will meet at the college in May.

Idaho University and Station.—Francis D. Farrell has been appointed irrigationist and director of substations in southern Idaho, beginning March 1. He will also act as representative of the university and station in that part of the State, and will outline cooperative tests with the fruit, dairy, and grain farmers of the region. L. C. Aicher has been appointed superintendent of the substation at Caldwell, and entered upon his duties April 1.

Purdue University and Station.—The facilities for work in farm mechanics have been greatly increased by the recent completion of the farm mechanics building. This is a brick structure with stone trimmings, with a 70-ft. frontage and a depth of 130 ft. It contains two laboratories each 57 ft. square, one of which will be used for heavy machinery and the other for light machinery. There are also two large class rooms, a drafting room, offices, a cement laboratory, tool and supply rooms, and miscellaneous laboratories.

A seed-testing laboratory has been established at the station in cooperation with the Bureau of Plant Industry of this Department. The laboratory is to be under the general supervision of the department of agricultural extension, with Miss Helen H. Henry and G. M. Frier as assistants.

Kansas College.—Samuel Dexter Houston died February 28, at the age of 92 years. He was a member of the board of regents from 1863 to 1869, and took a prominent part in securing the location of the college at Manhattan. John Elliott, regent from 1881 to 1883, died March 5, aged 77 years, and John N. Limbocker, regent from 1897 to 1899, died March 13, aged 80 years.

E. L. Holton, a graduate student at Teachers College, Columbia University, has been appointed professor of industrial education for the extension department. He will have charge of the introduction of agriculture, shop work, and home economics into the public school system of the State, and will supervise the corn contests, boys' corn clubs, and the new correspondence courses.

Massachusetts Station.—Frederick R. Church, assistant agriculturist from 1902 to 1906, was killed at Queens Station, Long Island, March 17, while attempting to board an electric car. J. F. Merrill has been appointed assistant chemist.

Michigan Station.—At a recent meeting of the State Board of Agriculture the superintendence of the South Haven Substation was placed in charge of the station horticulturist.

Minnesota University and Station.—J. A. Vye, instructor in farm accounts, secretary of the school of agriculture and the station, and treasurer of the school of agriculture, has resigned to engage in commercial work in Oregon.

Missouri University and Station.—Courses in poultry husbandry and agricultural journalism are being offered for the first time. The college of agriculture is also cooperating with the Frisco Lines in holding a night school of agriculture in St. Louis. The auditorium originally secured proved insufficient to accommodate the public desirous of attending. A similar school is also contemplated for Kansas City.

Charles T. Dearing, assistant in horticulture in the university and station, has accepted a position as scientific assistant in the viticultural investigations of the Bureau of Plant Industry of this Department, and has entered upon his duties.

New Hampshire College and Station.—At the April meeting of the board of trustees, E. D. Sanderson, whose resignation as director was called for last fall, to take place in the middle of the year, but who was retained as entomologist of the college and station, was dropped from the budget for the coming year. He will retire at the close of this college year.

New Jersey State Station.—Clarence L. Pfersch has resigned as assistant chemist.

North Dakota College.—The department of botany has prepared for sale at a nominal price to public schools a set of 20 mounted specimens illustrating the more common plant diseases.

Ohio Station.—Joseph D. Guthery, of Marion, has been appointed to the board of control, vice Dr. W. I. Chamberlain. At the annual reorganization of the board on March 9, John Courtright was reelected president, H. L. Goll, secretary, and D. L. Sampson, treasurer.

Oklahoma Station.—The resignation of J. A. Craig as director is announced, to take effect May 1.

Porto Rico University.—J. W. Hart, who was chosen dean of the college of agriculture in October, has severed his connection with the institution.

Utah College and Station.—The college has recently purchased a small herd of pure-bred Holstein cattle for use in class room and experimental work. P. V. Cardon, assistant agronomist in the station, has resigned to accept a position with the Bureau of Plant Industry of this Department, and will have charge of the cooperative work between the station and that Bureau which is being carried on at the dry farming substation at Nephi.

Virginia Truck Station.—P. T. Cole, a 1910 graduate of the college of agriculture of the University of Missouri, has accepted the position of assistant horticulturist, vice C. S. Heller, whose resignation has been previously noted.

Minnesota Conservation Congress.—What is reported to have been the first state conservation congress ever held occurred at St. Paul, March 16–19. The congress aroused much interest, especially among farmers, of whom it is estimated that over 3,000 were in attendance.

Among the speakers were Governor A. O. Eberhardt, who presided, Archbishop Ireland, James J. Hill, Secretary of the Interior Ballinger, Director George Otis Smith of the Geological Survey, Dr. H. W. Wiley of the Bureau of Chemistry of this Department, D. J. Crosby of this Office, President Cyrus Northrop and Dean Woods of the University of Minnesota, and several other members of the university and station staff. Special attention was given to the agricultural phases of the problem of conservation, and a notable feature was

the extensive exhibit of illustrative material by the Minnesota College and School of Agriculture and the station, the various booths of which were in charge of students.

Railroad Demonstration Farms.—It is announced that the New York Central and Hudson River Railroad has completed plans for the purchase and operation of three large farms in different sections of the State, as a demonstration of what can be accomplished for the rejuvenation of "run-down" farm properties by the application of modern scientific and business methods. These enterprises are to be managed strictly for profit, but it is intended to use no methods that are not equally available to neighboring farmers.

The Delaware, Lackawanna and Western Railroad is contemplating the purchase of one or more farms along its line, with a view to turning them over to the agricultural colleges or other agricultural institutions for maintenance as demonstration farms.

Announcement is made that the Great Northern Railway will institute a series of cooperative farm experiments in conjunction with various development and commercial clubs in the towns along its line. One farmer is to be selected near each town who will be paid at the rate of $10 per acre annually, in addition to his crop, for cultivating and cropping not less than 6 acres of ground under directions to be supplied.

Brooklyn Botanic Garden.—In cooperation with the Brooklyn Institute of Arts and Sciences, the City of New York has established a botanic garden in Brooklyn. A tract of about 30 acres of land in close proximity to the institute has been acquired for the purpose and the city has appropriated $100,000 for the construction of a laboratory building for investigation and instruction purposes and a range of experimental and public greenhouses. An endowment of $50,000 has also been secured from private sources, the income of which will be used for equipment.

In addition to research, instruction in botany is to be offered to both elementary and advanced classes, in close cooperation with existing educational agencies in Brooklyn. Dr. C. Stuart Gager, professor of botany in the University of Missouri and botanist in the Missouri Station, has been appointed director and will enter upon his duties July 1.

Agriculture at Cold Spring Harbor Biological Laboratory.—For the first time a course for teachers on the principles of agriculture is to be included in the instruction offered by the Biological Laboratory of the Brooklyn Institute of Arts and Sciences, at Cold Spring Harbor, Long Island, during the forthcoming session beginning July 6. The course will be under the direction of Prof. H. H. Laughlin, of the Missouri State Normal School, at Kirksville, and will continue six weeks.

Agricultural Libraries Round Table at the American Library Association.—The American Library Association, which is to meet at Mackinac Island, Mich., from June 30 to July 6, is to include in its program a round table conference, to be devoted to the consideration of the special work and problems of agricultural libraries. It is believed that this will be the first meeting of workers in agricultural libraries to be held in this country.

Michigan Society for Promotion of Agricultural Education.—The teachers of agriculture in several Michigan high schools have recently organized a Society for the Promotion of Agricultural Education in the Public Schools, with R. G. Carr, of North Adams, as president, and C. L. Nash of Lawton, as secretary. The association is open to all teachers of agriculture in the State, and it is intended to hold at least two meetings each year for the discussion of methods of promoting the school study of agriculture.

Agricultural Instruction at Normal Schools.—A short course in agriculture was held at the DeKalb (Ill.) Normal School during the week of December 6. Courses were offered in elementary agriculture, judging corn, horses, and dairy cows, testing milk, rope splicing, spelling farm words, and domestic science, and special lectures were given by Dean Davenport, President John W. Cook and C. W. Whitten, of the normal school, Frank H. Hall, of Aurora, Ill., and others. There were 75 students in attendance, ranging in age from 11 to 68 years.

In accordance with an act passed by the last legislature requiring the teaching of agriculture in the three state normal schools in Texas and making appropriations for this purpose, the Sam Houston Normal Institute, at Huntsville, has employed a special teacher of agriculture and is erecting a new building which will provide an agricultural laboratory and other facilities for teaching agriculture.

Extension Work at Agricultural High Schools.—Short courses of from 4 to 6 days were recently offered by the La Crosse County School of Agriculture of Wisconsin, and the McIntosh High School and the Lewiston Consolidated Agricultural High School of Minnesota. In each case the faculties of the respective state colleges of agriculture cooperated in the program.

Oklahoma District Agricultural Schools.—The new agricultural schools of Oklahoma have recently been opened, with an enrollment at the Cameron State School of 92, at the Haskell State School of 156, at the Fifth District State School of 78, and at the Panhandle Agricultural Institute of 51, with a number of prospective students waiting for accommodations.

Agricultural Training in Reformatories and Prisons.—The *Journal of the Department of Agriculture of Victoria* reports an interesting experiment in the reformatory treatment of boys from the Neglected Children's Department by giving them a course in viticulture and general agriculture in the buildings and on the farms of the Viticultural College at Rutherglen. The boys are received at the age of 14 and held until they are 18. They are thoroughly trained in general farm work, dairying, and viticulture, as well as along general educational lines.

A recent report of the New York State Prison Commission states that it is understood that the superintendent of prisons intends to make use of agricultural instruction in the new prison at Comstock, and that all first-term convicts will be sent there for this purpose.

Agricultural Education in Canada.—The University of Alberta, at Strathcona, has accepted plans for a building 230 ft. long by 70 ft. wide, with wings on the north and south ends 110 by 30 ft. It is not expected that the building will be completed inside of 3 years and the cost is estimated at approximately $500,000.

At the last meeting of the university senate the report of the executive committee regarding the organization of the agricultural college recommended the establishment of the following departments: Animal husbandry, agronomy, dairying, agricultural engineering, bacteriology, and veterinary science. In addition the departments of chemistry, biology, and geology will be common to the faculties of both arts and agriculture. It was decided to proceed with the organization of the agricultural faculty along the 3 following lines: (1) By the completion of the establishment of the agricultural faculty within the university at the earliest possible date; (2) by the establishment of a system of permanent secondary schools in connection with demonstration farms in those sections of the province not coming within the immediate scope of the college itself; (3) by the development of a department of extension teaching. The university work will not be confined to teaching but will include research work in connection with the various agricultural problems of the province.

In Saskatchewan last year about 150 agricultural meetings were held under the auspices of the agricultural department, and it is expected that this number will be greatly increased the coming year.

Dr. J. W. Robertson, principal of Macdonald College, has resigned. For the present he will be engaged in a study of agricultural and other conditions in foreign countries, with a view to obtaining information in connection with the conservation of Canada's national resources.

Agriculture in Cuba.—An estimate is included in the Cuban budget for 1910–11 of $112,200 for the maintenance of the six agricultural schools authorized for the several provinces by an act passed July 12, 1909. Under other clauses in the budget, $100,000 is to be used for cattle breeding, a like sum for holding an agricultural and industrial exposition, $30,000 for subsidies to private experimental farms, $20,000 for the purchase of plants and seeds, and $1,100,000 for paying the expenses of transporting immigrant farmers and farm laborers.

Agriculture in Santo Domingo.—Under a law recently signed by President Caceres, a general board of agriculture and immigration is established in Santo Domingo. This board will have supervision of all schools of agriculture, both public and private. An agricultural laboratory and an experiment station are contemplated, and the more general dissemination of agricultural literature is to be taken up. Another section of the law authorizes the president to import for sale at cost fertilizers, insecticides, and farm implements.

Agricultural Organization in Brazil.—A bureau of agricultural inspection has been organized in Brazil, which is to make a special study of agricultural conditions in that country, with a view to suggesting opportunities for improvement. It will have charge of the work of collecting and disseminating useful information among the farmers, promoting the introduction of new crops or the extension of those already under culture, compiling statistics on agriculture and animal husbandry, making crop estimates, and inspecting the agricultural schools and experiment stations.

For the purpose of carrying out its work, the country will be divided into 12 districts, with an inspector in charge of each. An expenditure of $300,000 in the northern states has been authorized for the introduction of irrigation and dry farming methods. A special investigation is to be made of the public rubber lands in the Acre Territory, with a view to their development, and the establishment of experiment stations for the cultivation and extraction of rubber is authorized.

Miscellaneous.—Prof. A. Klossovski has recently resigned the editorship of *Meteorologhīcheskoe Obozryenie* (Meteorological Review) and *Lyetopīscī Maghnitno-Meteorologhicheskoĭ Observatorīī Imperatorskagho Novorossīĭskagho Unīversītata* (Annals of the Magnetic-Meteorological Observatory of the Imperial Novo-Russian University). The final numbers to be issued under his direction contain an extended survey of his 27 years of pedagogical and scientific activity at the Novo-Russian University in the field of meteorology.

Miss A. B. Juniper, dean of the school of household science in Macdonald College since its establishment, has been appointed professor of household science at the Manitoba Agricultural College, and will have charge of the organization of the new department of household science.

Count Faina has resigned the presidency of the International Institute of Agriculture, and has been succeeded by the Marquis Cappelli.

It is announced that the fourth annual corn exposition will be held at Columbus, Ohio, January 30 to February 11, 1911.

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EXPERIMENT STATION RECORD.

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LIST OF EXPERIMENT STATION AND DEPARTMENT PUBLICATIONS REVIEWED.

Note.—The publications of the United States Department of Agriculture may be purchased from the Superintendent of Documents, Washington, D. C., to whom all remittances should be made. The price of *Experiment Station Record* is $1 per volume, and there will be two volumes each year. The prices of other technical publications are given above. The publications of the state experiment stations are distributed from the stations and not from the Department.

EXPERIMENT STATION RECORD.

Vol. XXII. June, 1910. No. 7.

The names of few foreign workers in agriculture are more familiar to readers in this country than is that of Professor Julius Kühn, of Halle. He was known to many personally, and by reputation to students of agriculture very generally. His writings and his teachings brought him into world-wide prominence. His death on April 14, at the ripe age of eighty-four years, closed the career of a really great man, a notable figure for a full half century, one whom the world had recognized and honored in life, and who leaves the record of a completed work.

Julius Kühn was a pioneer in agricultural science and teaching. He conceived and realized an ideal in agricultural education, secured a wider recognition for the subject from university authorities and practical agriculturists, and in his long career left a profound impress upon his nearly eight hundred students. The agricultural institute at Halle, the first of its kind affiliated with a university, was a product of his own initiative and labor, of his indomitable courage and perseverance in propagating an idea.

Young Kühn was born October 23, 1825, at Pulsnitz, a small town in the vicinity of Dresden. His father was a farmer of small means, and the son prepared himself to follow that vocation. After the public school period and two years at the Polytechnicum in Dresden he entered upon the career of farm manager, meeting with success in spite of his youth and gaining experience in several localities where different soil conditions were presented. He was much interested in the new agricultural theories which were being advanced by Liebig and others, and was quick to make the application of these in his farm management. Very soon he began to make agricultural experiments himself, and took up especially the study of plant diseases. This first experimental work was done while in charge of a farm in Silesia, which he managed for eight years.

His interest in these matters led to a desire for further study, and at the age of thirty, in 1855, he went to the agricultural academy at Poppelsdorf, near Bonn, which he attended for two semesters, going thence to Leipsic where he continued his studies in plant diseases and received his doctor's degree. In 1858 Kühn published his first book, an epoch-making treatise on the Diseases of Cultivated Plants, Their Cause and Control. This book approached the subject for the

first time in its scientific aspects from the standpoint of agriculture. It was a product of individual work in a comparatively new field and with meager facilities. The studies on which it was based were made with the aid of a secondhand microscope which he purchased for a few dollars. The book was well received and the edition was soon exhausted but was never revised, despite many requests for a new edition. Kühn continued his studies in that field throughout his career, and only a few years before his death took up the preparation of a revision of his book, which appears not to have been completed.

Following a semester as privat-docent in the agricultural academy at Proskau, Kühn became manager of a large estate in lower Silesia in 1857, where he remained for five years. It was during this period that his widely-known treatise on cattle feeding was written. A prize was offered through the Silesian Agricultural Society for the best treatise on some phase of agriculture. This prize was awarded in 1859 to Julius Kühn for his essay on cattle feeding,[a] which was first published in 1861. This was a blending of the scientific principles which had been developed at that time with the skill and judgment of the feeder. Kühn demurred at the attempt to make animal feeding on the basis of fixed standards which had been advanced by Grouven a matter of applied mathematics, and adopted for his book the now famous motto "the eye of the master fattens his stock," a doctrine which finds much endorsement among both practical feeders and investigators at the present day.

The preparation of this book illustrates the characteristics of the man. The sixty drawings contained in the first edition were all of them original, and many made from microscopic preparations. In referring to these in the preface the author takes occasion to impress upon young men the importance of individual effort—of independent seeing and reasoning. In the twelve editions through which this book has passed the scheme of treatment as shown by the table of contents has not changed. The chapter headings and subdivisions remain the same, but successive revisions have incorporated in the text the progress made in the subject as recognized by the author. The new matter added has made the later editions fully twice the size of the original essay.

In 1862 Kühn received a call to the chair of agriculture in the University of Halle. He was then thirty-seven years old, and his studies and his wide and successful practical career had made him exceptionally well fitted for such a position. Moreover, he had developed a keen interest in higher agricultural education, and was ambitious for connection with an institution which would give him

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[a] Die zweckmässigste Ernährung des Rindviehes.

opportunity for development along the line of his ideas. A call to the agricultural institute at Berlin was declined because it was not thought to afford him the desired opportunity.

Up to that time agricultural instruction had been confined mainly to special technical schools—agricultural academies, and there was little confidence in agricultural work in a university. Even Liebig's view that the union of agricultural courses with the universities would most advantageously meet the needs of agricultural students carried little weight with the Prussian authorities at that time. Chairs of agriculture had been established in some of the Prussian universities much earlier, but the subject had not been developed in any large way, the teaching was remote from the practical calling of the farmer, and the field of activity was limited principally to training experts and administrative officials.

It is therefore natural that the preference should have been given to independent agricultural academies located on the land and giving special attention to the practical phases of agriculture. There was little public confidence in the outcome of university instruction and little demand for it. Kühn's appointment at Halle was therefore regarded as a matter of no significance by the agricultural press of the day, and was referred to disparagingly.

But his announcement of courses showed that he brought to his position a new ideal and a different point of view. His success in winning confidence is evidenced by the attendance which his work attracted. In his first semester he had only three pupils, but in the spring semester the number increased to twenty, and this increase continued steadily until in the winter semester of 1864–5 the attendance was 122. This equaled the highest attendance at the older agricultural academies. His instruction developed the advantage of higher education in agriculture, which combined a knowledge of science and principles with their application in practice. A feature of his success appears to have been this ability to give a practical bent to his scientific deductions, a trait which rested on his deep interest and his wide familiarity with agricultural practice.

It was Kühn's ambition from the first to establish an agricultural institute for teaching, investigation, and demonstration. His idea was that of a college correlated with the work of the university and forming an integral part of it. It was an effort to secure recognition of agricultural theory and practice as a subject suited to university courses and entitled to specific provision in the way of organization and facilities. This would give an individuality to the agricultural instruction, and win for it a place among the special schools of the university.

The story of Kühn's struggle to secure authority for the establishment of such an institute, his effort to provide land necessary for it, and later funds for buildings, illustrates how undeveloped was the idea of agriculture as a subject for teaching and investigation in the university, and how little confidence and interest there was among those in authority. His persistent efforts won, however, and in 1863 the institute was authorized. Kühn personally advanced and borrowed money to pay for the land, which was later taken over by the university, and after much labor secured a grant of about $1,500 for adapting buildings upon it to his purpose.

The success of the new institute won support for it, and five years later new buildings were erected to better serve its needs. The idea grew, and similar institutes were established at other universities, but Halle maintained its lead. In 1890 its attendance exceeded that of all the other agricultural institutes in Prussia combined, including the agricultural high school at Berlin. The students then numbered two hundred and eighty-one.

Experimental and demonstration work had early formed a part of Kühn's plan for the agricultural institute. Land was acquired from time to time for the purpose, other parcels leased for continuous field experiments, and Kühn personally purchased over thirty acres which were leased to the university to secure continuity of the work. Experimental fields and gardens, greenhouses, stables, etc., were provided. In 1886 the area under the institute included about 275 acres, used mainly for the experiments and the maintenance of live stock. The stables, known as the *Haustiergarten*, were perhaps Kühn's special pride and interest. Here he made studies of races, breeds and breeding, feeding experiments, etc. The collection of domestic animals increased steadily until he had about one thousand head, representing over one hundred and thirty races and breeds.

Like many of the earlier workers in agriculture, Kühn's studies and writings covered an unusually wide field. His contributions were published for the most part as reports from the physiological laboratory and experiment station of the institute at Halle, in a series begun by him in 1872. Among the subjects included were soils, drainage, fertilizers and manures, the culture and manuring of various field crops, nitrogen assimilation, plant diseases, nematodes, animal feeding and breeding, and agricultural machinery.

Among his noteworthy works were his studies on nematodes as a cause of sugar beet sickness, which he found could be destroyed by burning over the ground. He was a prolific writer for the more popular agricultural journals throughout Germany, taking special interest in presenting the results of his studies to those engaged in practical farm operations.

Professor Kühn was the recipient of many honors from the government and from various societies and associations. He was made *Geheimrat* in 1882, and in 1903 was given the title of *Exzellenz*. Orders were conferred upon him by his own and foreign governments; he was awarded the Liebig medal and the Prussian gold medal for service to agriculture; and he was made an honorary member of a long list of societies and academies.

Personally Kühn was of a kindly, sympathetic disposition that made him beloved as he was respected by all who came within the sphere of his influence. His relations with his students were unusually close, and he was affectionately known among them as "Father Kühn." They united with a long list of his admirers in honoring him in a public celebration of his seventieth birthday in 1895, and again on his eightieth birthday ten years later. His declining years were marked by a remarkable vigor and continuance of activity. He accomplished well what in early life he set out to do, and his name will long live in the institute to which he gave a world-wide reputation.

There has been great activity in recent years in the study of the relation of bacteriological activity to soil fertility, and valuable contributions have been made to the knowledge of this subject. These studies are clearing up problems of soil fertility which chemical and physical investigation had left obscure, and are showing how profoundly soil processes are modified and controlled by bacteriological action.

Quite recently, Russell and Hutchinson of the Rothamsted Experiment Station have aroused a new interest in the subject through reports of their studies of the effect of partial sterilization by means of heat or volatile antiseptics upon the productiveness of soils. These studies have been characterized by Prof. A. D. Hall, director of the Rothamsted Station, as "the most notable addition to the theory of the soil since the publication of Hellriegel and Wilfarth's paper on the nodule bacteria in 1886."

These investigators found, in agreement with many others, that the fertility of the soil can be greatly increased by heating or by treatment with volatile antiseptics. It was observed many years ago that treatment of vineyard soils with carbon bisulphid for the purpose of destroying phylloxera resulted in an increased productiveness which could not be entirely accounted for by the destruction of the phylloxera. Dr. G. E. Stone, of the Massachusetts Experiment Station, observed that steaming greenhouse soils to destroy nematodes apparently increased the actual fertility of the soil. Dr. Bernard Dyer reported the same result from steaming garden and greenhouse soils. More recently Prof. T. L. Lyon and Mr. J. A. Bizzell, of the

New York Cornell Experiment Station, have reported experiments showing that while steaming soil under two atmospheres pressure for two to four hours apparently produced substances which were at first injurious to plant growth, a luxuriant growth took place later on the sterilized soil.

Russell and Hutchinson found that, although the treatment with heat or volatile antiseptics (toluene) enormously reduced the number of bacteria present, it did not effect complete sterilization, and that when the conditions were again made favorable for growth in the partially sterilized soils the number of bacteria rapidly increased and eventually became much more numerous than they had ever been under normal conditions in the untreated soil.

In a summary of these investigations, Director Hall states that "with this increase in the number of bacteria in the soil came an increase in the rate at which ammonia was produced by the breakdown of the more complex carbon compounds of nitrogen that were present in the soil. When no plants were present to take up this ammonia, it accumulated in the soils, because the bacteria which convert nitrites and nitrates had been completely destroyed. It thus appeared pretty clear that the increased fertility of the treated soils was due to their greater power of breaking down the complex organic matter of the soil to the state of ammonia, a form in which plants can assimilate nitrogen; and this increased production of ammonia was due to an exceptional multiplication of the ammonia-splitting organisms which constitute so large a proportion of the normal bacterial flora of the soil.

"The authors then carried out various experiments, which showed (1) that no stimulus could be supposed to have taken place through the treatment which would make the bacteria remaining in the soil more active; (2) that there had been no selective destruction of organisms which would leave behind a population of a more active type than the usual mixed flora of the soil. By other steps which need not be here set out, it became clear that the difference between the treated and untreated soils was due to some factor in the latter which normally limits the number of bacteria, and therefore the rate of production of ammonia. Search for this unknown factor disclosed the presence, in all soils so far examined, of numbers of protozoa and ameba which live on bacteria and keep their numbers down to the comparatively low limit specified. The heat [illegible] treatment with antiseptics kills off all these large organisms, but leaves unhurt some spores of the ammonia-producing bacteria, which afterwards can develop to a much greater extent than in the untreated soil because they are freed from their normal check.

"The theory as it stands then assumes that, putting aside its physical characteristics, the fertility of a soil is determined by the

activity, or rather by the number, of its ammonia-producing bacteria, and the number is kept in equilibrium by the activity of the protozoa for which these bacteria serve as food. Any cause which destroys or reduces the number of the protozoa enables the bacteria to extend their territory, and so raises the fertility of the soil. The authors have also carried out a number of collateral experiments, which show that the direct additions of these large organisms will rapidly reduce the activity of various fermenting media, but this and other positive evidence in favor of the theory have not as yet been published."

The direct evidence furnished by the reports of the investigations of Russell and Hutchinson which have been published to date is hardly sufficient to cause the theory advanced to be fully accepted by scientists, although we are assured that the subject is being rigidly investigated in all of its phases and additional data of great importance have already been accumulated. But it is interesting to note that since the publication of the results of this work attention has been called by various writers to certain practices which are thought to bear on the theory.

For example, it has been suggested by Mr. H. H. Mann and others that the beneficial effect of the practice of "ráb" on rice lands in India, which consists of turning up the soil and exposing it to the action of the intense heat and light of the sun, may be attributed to partial sterilization, and Mr. J. Aitkin suggests that the beneficial effect of heating the surface soil by means of intense and long-continued fires as practiced in certain parts of England may be attributed to the same cause. If further investigation shall show that such practices as these bring about increased productiveness as a result of partial sterilization, it will go far toward demonstrating the practical utility of Russell and Hutchinson's conclusions.

The practical application of their work is, however, being put to direct test by the investigators themselves, in experiments on methods of increasing the productiveness of soils in the open by the use of various means of suppressing the injurious organisms. Such work suggests a wide field of interesting investigation, not only in connection with the handling of garden and greenhouse soils, but also with regard to the effect of intense heat and light upon the bacterial activities of the soils of the arid regions of the United States under various methods of tillage.

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

Physical-chemical methods as applied to physiology, L. ASHER (*Handb. Physiol. Methodik, 1 (1908), 2. Abt., pp. 113–232, figs. 42*).—A description of the more important physical-chemical methods which are employed in physiological research.

Progress in fat and oil chemistry for 1908, F. ULZER and P. PASTROVICH (*Chem. Ztg., 33 (1909), Nos. 153, pp. 1337–1339; 154, pp. 1345–1347*).—This is a résumé of the advances made in fat and oil chemistry during 1908, especially of those phases pertaining to pure and analytical chemistry.

Linseed oil and other seed oils, W. D. ENNIS (*New York, 1909, pp. XIV+316, figs. 71*).—This book treats chiefly of the production of linseed oil and the chemical control of its manufacture. In it are discussed the development of the linseed-oil industry in the United States, the handling of seed and the disposition of its impurities, grinding, tempering the ground seed and molding the press cake, pressing and trimming the cakes, the hydraulic operative equipment, the treatment of the oil from the press to the consumer, the preparation of the cake for the market, the oil yield and output, shrinkage in production, cost of production, operation and equipment of typical mills, other methods of manufacturing, the seed crop, the seed trade, chemical characteristics of linseed oil, boiled oil, the linseed-oil market, and the feeding of oil cake. Chapter 18 deals with refined and special oils, while chapter 22 deals with the cotton-seed oil industry.

Melting and solidification points of mixtures of stearic, palmitic, and oleic acids, E. CARLINFANTI and M. LEVI-MALVANO (*Gaz. Chim. Ital., 39 (1909), II, No. 4, pp. 353–385, figs. 6; abs. in Analyst, 35 (1910), No. 406, pp. 30, 31*).—From their work the authors conclude that mixtures of stearic and palmitic acids form 4 series of solid solutions, and one additional compound which corresponds to the old margaric acid and to the newer daturic acid, and possibly to the synthetic margaric acid of Heintz and Krafft. Mixtures of stearic and oleic acids, and of palmitic and oleic acids, form only a single series of solid solutions.

Tables are presented of the results, and when these are platted and the proportion of oleic acid found from the iodin number it is possible to calculate the proportion of stearic and palmitic acid in a mixture of the three.

The ferments and their action, C. OPPENHEIMER (*Die Fermente und Ihre Wirkungen. Leipsic, 1909, 3. ed., rev., pp. XI+491*).—This is the "special part" of the third revised edition. The enzyms or ferments treated are the esterases, carbohydrases, amidases, proteases, coagulases, oxidases, catalases, and fermentation enzyms or zymases. The references to the literature are a valuable feature.

Retardation of rennet action, S. G. HEDIN (*Ztschr. Physiol. Chem., 63 (1909), No. 2–3, pp. 143–154*).—This is a continuation of the author's researches on the effect of charcoal on the inhibition of rennet action. He finds that the retardation can be prevented by different substances, such as clarified

egg which has been treated with hydrochloric acid and neutralized or serum which has been treated in the same manner. The explanation given is that these substances are supposed to contain some of the same materials as rennet and apparently displace it in the charcoal.

The coloring matter of the tomato, R. WILLSTÄTTER and H. H. ESCHER (*Ztschr. Physiol. Chem.*, *64* (*1910*), *No. 1*, *pp. 47–61*, *pl. 1*, *fig. 1*).—Lycopin, the coloring matter obtained from the tomato by the author, differed markedly in shade from carotin. While these hydrocarbons are alike as to molecular weight and behavior toward oxygen, it is shown that the rate of autoxidation is greater with lycopin, and their combinations with the halogens and their crystallization on cooling the solutions seem to show that they are different bodies.

Composition of gas from cottonwood trees, F. W. BUSHONG (*Trans. Kans. Acad. Sci.*, *21* (*1907–8*), *pt. 1*, *p. 53*).—Having noticed that gas bubbles in the sap upon the freshly cut trunk, stump, and chips of cottonwood trees contained an inflammable gas, the author collected gas from a hole bored into the heart of a cottonwood tree and submits the results of analyses of it made by McFarland.

The constituents found were: Oxygen, 1.24; carbon dioxid, 7.21; methane, 60.90; and nitrogen, etc., by difference, 30.65 per cent. Olefines, carbon monoxid, hydrogen, and ethane were not found.

Bacterial action the cause of the corrosion of steel, R. H. GAINES (*Abs. in Chem. Ztg.*, *33* (*1909*), *No. 145*, *p. 1268*).—It is concluded that bacteria are one of the chief causes of corrosion of steel in the soil, as the author found on analyzing the rust that it contained much organic matter and from 1.41 to 3.95 per cent of combined sulphur (calculated as SO_2), whereas the original steel contained but 0.05 per cent of sulphur.

Quantitative estimation of the decomposition of potassium nitrate by micro-organisms, H. FRANZEN and E. LÖHMANN (*Ztschr. Physiol. Chem.*, *63* (*1909*), *No. 1*, *pp. 53–102*; *abs. in Analyst*, *35* (*1910*), *No. 406*, *p. 24*).—Known amounts of potassium nitrate were added to peptone media and the tubes inoculated with various bacteria. The amount of nitrate remaining at the end of specified periods, together with the nitrite (after the latter had been oxidized by hydrogen peroxid), was estimated by Busch's nitron method (E. S. R., 16, p. 945). The nitrate alone was also determined after destroying the nitrite with hydrazin sulphate. In this way a measure could be obtained as to the amount of nitrite formed.

On the basis of these experiments the authors classify the bacteria into 3 groups, (1) those which convert the nitrate into nitrite without further decomposition of the nitrite (*Bacillus plymouthensis*, *B. prodigiosus*, *B. kiliense*, *Proteus vulgaris*, *B. coli communis*, and *B. typhi murium*), (2) those which decompose the nitrate and immediately convert the nitrite into nonoxidized nitrogenous compounds (*B. pyocyaneus*), and (3) those bacteria which have no effect on nitrates at all (*B. fluorescens liquefaciens*).

Determination of small quantities of nitrogen, T. ZELLER (*Landw. Vers. Stat.*, *71* (*1909*), *No. 6*, *pp. 437–440*).—This is a criticism of Mitscherlich's method (E. S. R., 21, p. 208). Comparisons are made between the figures actually found by Mitscherlich and those set down as the limit of error, attention is drawn to the fact that errors are liable to occur in the method, and finally the author raises the question whether it is really necessary to have so accurate a method as this.

Nitrogen determination in soil extracts, DENSCH (*Chem. Ztg.*, *33* (*1909*), *No. 143*, *pp. 1249–1251*).—The author has reinvestigated his own method and claims that the error is never higher than 0.3 mg. Mitscherlich's assertion

(E. S. R., 22, p. 510) that the error is from 0.42 to 0.53 mg. he therefore deems incorrect.

The determination of colloids in clays, K. ENDELL (*Ztschr. Chem. u. Indus. Kolloide, 5 (1909), p. 244; abs. in Chem. Ztg., 33 (1909), No. 156, Repert., p. 675*).—The dry clay is boiled with Canada balsam, and after cooling and hardening it is cut into small sections and colored with fuchsin. By photographing the sections the areas can be located which contain the colloids (SiO_2, Al_2O_3, Fe_2O_3). These are cut out and weighed.

Studies for the determination of phosphoric acid in phosphatic slags and natural phosphates by the citro-mechanical method, E. GUERRY and E. TOUSSAINT (*Bul. Soc. Chim. Belg., 23 (1909), No. 11, pp. 454–457*).—This is a further study of the method previously noted (E. S. R., 18, p. 107).

The authors now propose the following procedure: Two and five-tenths gm. of the material are placed in a 250 cc. Jena flask with about 20 to 25 cc. concentrated sulphuric acid and heated, care being taken not to allow the material to adhere to the sides of the flask. The mixture is kept boiling for 10 minutes, then allowed to cool somewhat, water added in small quantities, cooled again, filled up to the mark with water, and filtered. Twenty-five cc. of the filtrate are then taken in a beaker, neutralized with ammonia, allowed to cool, and 30 cc. of ammonium citrate solution (containing 10 gm. of citric acid), and 15 cc. of concentrated ammonium hydroxid added. After placing in a shaking apparatus, 35 cc. of magnesium mixture is added dropwise, the mixture shaken again for 25 minutes, filtered, and the precipitate washed with dilute ammonia and ignited as usual.

A study of the methods for the determination of iron and alumina in phosphate rock, W. C. DUMAS (*Amer. Fert., 31 (1909), No. 5, pp. 7–14*).—The author concludes from his work "that there is no more error due to impurities in the Glaser alcohol method than there is in the acetate method, and that this error seldom amounts to 16 per cent." It is further shown that a combination of the Glaser alcohol and acetate methods furnishes very good results, and that it consumes no more time than either of these alone. It is advisable to remove fluorin in solution in the acetate method as the results run low, and the iron should be present in the ferric state.

"In the Glaser alcohol method the calcium salts should be precipitated in a 50 per cent alcohol solution, containing considerable excess of free HCl. When the phosphates are precipitated by ammonia, only the slightest excess is permissible. . . . Blasting the $FePO_4$ and $AlPO_4$ is not necessary if they are ignited strongly over the Bunsen burner for 15 minutes. The Glaser alcohol is the best method of all for iron and aluminum in the hands of the inexperienced."

The determination of iron and alumina in inorganic plant constituents, R. F. HARE (*Jour. Indus. and Engin. Chem., 2 (1910), No. 1, pp. 27, 28*).—Owing to the fact that the Association of Official Agricultural Chemists have no official method for the determination of iron and alumina in the presence of phosphorus in inorganic plant constituents, the author proposes a method which yields satisfactory results and which is not so troublesome as the methods usually recommended by others. The methods of separating the 2 elements are described and a method for determining the iron is also given.

Two volumetric methods for determining calcium and magnesium, V. SCHENKE (*Chem. Ztg., 33 (1909), No. 150, pp. 1313, 1314*).—These methods allow the determination of lime and magnesia and lime alone, in gray limes, raw or burnt lime, lime ashes, marls, soils, and silt.

The first method consists of adding to 2.5 to 5 gm. of material 125 cc. normal hydrochloric acid in a 250 cc. long-necked flask, and allowing this to stand upon the boiling water bath for at least one-half hour, and then filling to the mark

with water. The acidity remaining in 50 cc. of this mixture is titrated with one-half normal potassium hydroxid, using phenolphthalein as an indicator. One cc. of one-half normal acid is then added and boiled for 2 minutes in order to remove the remaining carbon dioxid, and titrated back with one-half normal potassium hydroxid. The calculation, which considers both the lime and magnesia as calcium hydroxid, is, for 1 gm. of titrated substance, $\left(51-a.\frac{n}{2}\text{KOH}\right)1.4$, a signifying the total amount of one-half normal potassium hydroxid used.

The second method consists of a modification of the Balthasar method, but uses only one-half as strong a titrated potassium permanganate solution and a larger amount of substance than the original method and allows of the determination of the lime alone. The difference between the calcium oxid determinations of the two methods, multiplied by five-sevenths, gives the magnesia content of the substance. The presence of silica does not influence the results in any way, but a large amount of phosphorus does in the case of the second method.

Volumetric determination of small amounts of arsenic, L. W. Andrews and H. V. Farr (*Ztschr. Anorgan. Chem., 62 (1909), No. 2, p. 123–128; abs. in Ztschr. Untersuch. Nahr. u. Genussmtl., 19 (1910), No. 1, pp. 31, 32*).—The material, if in solution, is concentrated to a bulk of 15 to 20 cc. There is then added 2.5 times its bulk of a solution consisting of 20 gm. of stannous chlorid crystals and 40 gm. of tartaric acid, made up to the liter with 40 per cent hydrochloric acid.

The mixture is then allowed to stand for 2 to 3 hours in a stoppered glass bottle (capacity 80 to 100 cc.) in a warm place until the supernatant liquid is clear. The precipitate formed is collected on an asbestos filter with the aid of hydrochloric acid, washed with water, and with the asbestos put back in the original bottle and shaken with a known amount of a one-hundredth or one-tenth normal iodin solution and a sufficient quantity of 5 per cent of sodium bicarbonate or sodium phosphate solution to obtain a neutral reaction. The shaking process is continued until all the arsenic is dissolved, when the excess iodin is titrated with a one-hundredth or one-thousandth normal arsenite solution. For arsenic under 0.5 mg. one-thousandth normal and for 10 to 100 mg., one-tenth normal solution can be used. In the first instance, however, a correction of 0.6 cc. of a one-thousandth normal solution for every 50 cc. of solution employed must be applied.

Aids to the analysis of food and drugs, C. G. Moor and W. Partridge (*London, 1909, 3. ed., pp. 249*).—This is a small handy volume, dealing with the general analysis of foods and drugs, and containing much matter of interest to the public analyst.

A source of error in the examination of foods for salicylic acid, H. C. Sherman (*Jour. Indus. and Engin. Chem., 2 (1910), No. 1, pp. 24, 25*).—It is commonly assumed in testing foods for preservatives that a body soluble in ether, volatile with steam, sublimable, and crystallizable, and giving a violet reaction with ferric chlorid, is salicylic acid. The author draws attention to the fact that in the case of cereal foods this coloration is probably due to the maltol of Brand, as no reaction could be obtained with Jorissen's reagent. A recommendation is made to adopt Jorissen's reaction for such work.

See also Backe's work in this regard (E. S. R., 22, p. 412).

Detection of formaldehyde in chopped meat, W. Bremer and R. Beythien (*Ztschr. Untersuch. Nahr. u. Genussmtl., 18 (1909), No. 12, pp. 733–737*).—Comparative tests were made between the Rideal and Hehner methods, the latter being considered the more satisfactory.

Honey investigations, WITTE (*Ztschr. Untersuch. Nahr. u. Genussmtl., 18 (1909), No. 11, pp. 625–649*).—The author concludes from an examination of 52 samples of honey by the general methods, which are described, that the external characteristics such as appearance, color, consistency, odor, and taste do not give any definite clue as to adulteration. He considers the following determinations important: The nitrogenous substances, tannin precipitation after Lund, Ley and Fiehe's reaction, testing for glucose according to Fiehe's method, polarization before and after inversion, and calculation of saccharose. In certain cases the determination of water may be essential. Determining the ash and acid is of little significance but may be done with certain suspicious samples.

Sampling of ground spices, H. E. SINDALL (*Amer. Jour. Pharm., 82 (1910), No. 2, pp. 80–82*).—The author discusses the methods which he has found satisfactory for taking samples for analysis of ground black pepper, ground red pepper, whole mustard seed, and other spices.

Detection of adulterations in coffee, H. KÜHL (*Apoth. Ztg., 25 (1910), No. 2, pp. 15, 16*).—Determining the amount of caffein alone in coffee samples is not sufficient to detect adulteration. On the other hand, examining the coffee microscopically yields only qualitative results and does not give the extent of the adulteration. The author therefore suggests the employment of the microscopic examination in conjunction with the shaking test, and finally the determination of the extract. Surrogates yield more extract than true coffee and usually leave a greater sediment.

Examination of milk, A. BEHRE (*Pharm. Zentralhalle, 50 (1909), No. 8, p. 156; abs. in Ztschr. Untersuch. Nahr. u. Genussmtl., 19 (1910), No. 1, p. 41*).—It is shown that the amount of dry substance calculated by Fleischmann's formula and that found on analysis agree in general up to 0.2 per cent. With watered milks there were variations up to 0.7 per cent.

The refraction of the calcium chlorid milk serum, C. MAI and S. ROTHENFUSSER (*Ztschr. Untersuch. Nahr. u. Genussmtl., 18 (1909), No. 12, pp. 737–763*).—An examination of the milks from 12 herds, receiving various feeds and in different stages of lactation, showed variations in the refraction of the calcium chlorid serum only between 0.2 and 0.6 scale divisions. Mixed milk from 2 to 29 cows showed differences of from only 0.1 to 0.55 scale divisions. It is therefore considered certain that the determination of the refractive index of the calcium chlorid serum of a milk is a most important means to detect added water.

The significance of the nitrate reaction in milk, E. VON ERNEYI (*Milch Ztg., 38 (1909), No. 44, pp. 519, 520; abs. in Biochem. Centbl., 9 (1909), No. 11, p. 541*).—The author considers that even though a milk gives a reaction with diphenylamin, it is not absolutely certain that the same has been watered.

The determination and judgment of the dirt content of milk, G. FENDLER and O. KUHN (*Ztschr. Untersuch. Nahr. u. Genussmtl., 19 (1910), No. 1, pp. 13–21, figs. 9*).—The authors, after reinvestigating the Weller method (E. S. R., 21, p. 414; 22, p. 11), find that the residue from the filter which is designated as milk dirt consists partly of normal milk constituents. They therefore conclude that the method is not reliable.

A rapid method to detect boric acid in milk and butter, E. GAUVRY (*Ann. Chim. Analyt., 15 (1910), No. 1, pp. 14, 15*).—This reaction is based on the fact that a red coloration is produced when crystals of oxalic acid and turmeric are added to milk or butter according to the specifications set down by the author.

Observations in regard to the determination of carbohydrates in feeding stuffs, P. C. DEN HERDER (*Pharm. Weekbl., 46 (1909), No. 47, pp. 1306–1312*).—

This is a discussion of methods and of the possible channels of error in feeding stuffs analysis.

The flash point in wax analyses, E. Stoeber (*Chem. Ztg., 33 (1909), No. 146, pp. 1275, 1276, fig. 1*).—The author recommends the introduction of the flash test amongst wax analysis methods.

In his tests unbleached beeswax had a flash point between 242° and 250° C. White wax is thought to be between 245° and 258°. Materials which are generally used for adulterating beeswax, such as beef tallow, stearin, colophony, Japan wax, and paraffin wax, had flash points ranging from 181° to 316°. Tests made with mixtures of beeswax (flash point 246°) and ceresin showed with an addition of 5 per cent of the latter a flash point at 236°; with 25 per cent, 213.5°; and with 50 per cent, 203°.

Extracted beeswax, O. G. Gabrilowitsch (*Abs. in Chem. Zentbl., 1909, II, No. 18, pp. 1599, 1600; Jour. Soc. Chem. Indus., 28 (1909), No. 23, p. 1259*).—The following results from extracted Russian beeswax were obtained: Specific gravity, minimum 0.95, maximum 0.97, and average of 100 samples 0.96; melting point, minimum 60° C., maximum 64°, and average 62°; acid value, minimum 18, maximum 22, average 20; saponification value, minimum 88, maximum 100, and average 94. The minimum ratio number was 3.88, the maximum 3.55, and average 3.7.

Some technical methods of testing miscellaneous supplies, P. H. Walker (*U. S. Dept. Agr., Bur. Chem. Bul. 109, rev., pp. 68, figs. 3*).—This is a revision of Bulletin 109, prevoiusly noted (E. S. R., 19, p. 1008). Much new matter has been added and, where deemed necessary, the chapters have been revised.

Aluminum dishes and certain other apparatus for quantitative electrolytic analyses, J. Formánek and F. Peč (*Chem. Ztg., 33 (1909), No. 147, pp. 1282, 1283, figs. 3*).—In order to substitute a cheaper material for platinum in electrolytic analysis the author employs an aluminum dish coated on its inner side with copper. Judging from the results obtained this is very satisfactory. Some auxiliary apparatus is also mentioned.

Apparatus for the quantitative estimation of ammonia in air, P. Liechti and E. Ritter (*Chem. Ztg., 33 (1909), No. 145, pp. 1265, 1266, fig. 1*).—The apparatus is designed for the estimation of small amounts of ammonia (such as are given off from the soil) in large quantities of moving air. A reproduction of the apparatus is shown. The ammonia is absorbed by normal sulphuric acid.

The influence of the structure of the cane on mill work in sugar factories, N. Deerr (*Hawaiian Sugar Planters' Sta., Div. Agr. and Chem. Bul. 30, pp. 42, figs. 4*).—This work is divided into 3 parts, as follows: On Analytical Controls of Cane Weights; Some Experimental Studies on the Milling of Canes; and The Structure of the Cane as Affecting Mill Work.

The results of the first investigation indicate that the ratio between the total solids percentage of the absolute juice of the cane (which includes everything which has not been left behind in the cane extracted with water, viz, protoplasm, the colloid water of Geerligs, and the water other than juice of Watts), and that expressed by the first mill juice lies between 0.97 and 0.98. This ratio is the same for at least 3 varieties of cane with a content of crude fiber varying from 10 to 14 per cent. This is applied to the sugarhouse conditions and the formula therefor is appended. With this, if the density of the absolute juice of the cane be known, it is possible, with only the analytical data, to express all the important measurements in mill-work control in terms of cane, and if the weight of bagasse, of mixed juice, or the added water be known all the other quantities can be calculated.

From part 2 it appears that with a 9-roller mill the best extraction is obtained when a system of compound saturation is followed, while the lowest is

obtained when all but the water is added before the last milling. There was little difference found between the use of hot water and cold water. With a 12-roller mill the same results were obtained. The 12-roller mill was found to be more economical to operate.

In part 3 it is shown "that the milling process is very effective so far as regards the soft interior pith, but very crude as regards the extraction of sugar from the hard outer rind; probably with saturation processes using imbibition very little of the water is taken up by the rind tissue."

The froth fermentation of molasses, H. A. TEMPANY (*West Indian Bul., 10 (1909), No. 2, pp. 130–137*).—This fermentation is not due to micro-organisms but to the decomposing of gummy bodies, such as glucinates produced during the process by the action of lime on glucose and which break down with the evolution of carbon dioxid.

Crystallization of sugar from fruit sirups, E. LUHMANN (*Pure Products, 6 (1910), No. 2, pp. 59–64*).—This is a résumé of the newer views as to the cause of the crystallizing out of sugar in fruit sirups.

The value of peaches as vinegar stock, H. C. GORE (*U. S. Dept. Agr., Bur. Chem. Circ. 51, pp. 7*).—The author's summary is as follows:

"The most important conclusions to be drawn from this work are, first, that peaches contain sufficient fermentable sugar for use as vinegar stock, and, second, that they can be successfully handled by machinery already in use for making apple cider and vinegar. Other points of interest are as follows: (1) But little variation was found in the composition of the same variety of peaches when obtained from different localities. (2) The peach juices analyzed were found to be richer in sugar than those which have been previously analyzed by others, but they were about 1 per cent lower in sugar than average apple juices. They were considerably richer than apples in sucrose and in acid. (3) It was found that the use of pure culture yeasts was not necessary to insure rapid alcoholic fermentation. (4) The ciders prepared from peaches were considerably poorer in alcohol than apple ciders on account of the fact that peaches contain less total sugars than apples. (5) The presence of brown rot was found not to interfere with the alcoholic fermentation of the ground peaches, but a large proportion of the sugars was wasted by allowing the fruit to rot before fermenting. (6) Well-flavored vinegars were produced by the use of a small quick-process generator. These vinegars were of acceptable quality, though turbid, and did not possess the distinctive peach flavor."

Extracts from the proceedings of the Association of Official Agricultural Chemists, 1909 (*U. S. Dept. Agr., Bur. Chem. Circ. 52, pp. 32*).—This advance circular contains the reports of the committees on the recommendations of the referees with reference to phosphoric acid, nitrogen, potash, soils, waters, insecticides, dairy products, medicinal plants and drugs, sugars, and foods, a brief statement as to other action affecting the work in 1910, including a note with reference to defraying expenses for the subsequent publications of the association, together with a list of the officers, referees and committees appointed for the year 1910, and a set of alcohol tables prepared by the U. S. Bureau of Standards.

METEOROLOGY—WATER.

The agricultural engineer and the Weather Bureau, T. H. MEANS (*Mo. Weather Rev., 37 (1909), No. 12, pp. 1107, 1108*).—The importance of weather records in the solution of engineering problems is briefly set forth and it is pointed out that "records from remote localities are often the most important and the extension of the Weather Service over new territory will be very valuable to future generations."

Monthly Weather Review (*Mo. Weather Rev., 37 (1909), Nos. 11, pp. 841–996, figs. 9, charts 32: 12, pp. 997–1153, figs. 7, charts 33*).—In addition to the usual climatological summaries, weather forecasts and warnings for November and December, 1909, river and flood observations, lists of additions to the Weather Bureau library and of recent papers on meteorology and seismology, a condensed climatological summary, and climatological tables and charts, these numbers contain the following special papers:

No. 11.—Important Problems in Climatology, by F. H. Bigelow, and Average Annual Rainfall of Porto Rico, W. I. (illus.), by O. L. Fassig.

No. 12.—The Lake Region—General Features (illus.), by J. H. Armington; The Effect of Drainage Work in Northern Iowa on the Flood Stages of the Rivers, by A. Marston (see below); The United States Weather Bureau in the Work of the Engineer, by J. A. Ockerson; The Agricultural Engineer and the Weather Bureau, by T. H. Means (p. 614); Practical Benefits of the Weather Bureau, by H. W. Sheley; The Rainfall of Hetch Hetchy Valley (illus.), by A. G. McAdie; and The West Umatilla River Water-users' Association, by J. W. Campbell.

Meteorological observations at the Massachusetts Agricultural Experiment Station, J. E. Ostrander and C. M. Damon (*Massachusetts Sta. Met. Buls. 253, 254, pp. 4 each*).—Summaries of observations at Amherst, Mass., on pressure, temperature, humidity, precipitation, wind, sunshine, cloudiness, and casual phenomena during January and February, 1910. The data are briefly discussed in general notes on the weather of each month.

Meteorological observations (*Michigan Sta. Rpt. 1909, pp. 167–179*).—Tabulated daily and monthly summaries are given of observations during 1908 on temperature, pressure, precipitation, cloudiness, wind movement, etc.

Meteorological summary for the year 1908, A. E. Bells (*Wyoming Sta. Rpt. 1909, pp. 40–48*).—Summaries are given of observations at Laramie, Wyo., on pressure, temperature, precipitation, humidity, sunshine and cloudiness, and wind movement during 1908. The mean annual temperature was 40.3° F., and the total precipitation 13.53 in.

"The average temperature for the year was but a fraction of a degree below the mean for the previous 17 years. The highest temperature for the year was 86°, occurring on the 9th of August, and the lowest was −24° on the 14th of November. . . . A total of 13.53 in. precipitation for the year is 3.5 in. more than the average for the previous 17 years."

Summer temperatures in different parts of Europe, H. H. Hildebrandsson (*Compt. Rend. Acad. Sci.* [*Paris*], *149 (1909), No. 17, pp. 703–705, fig. 1; abs. in Rev. Sci.* [*Paris*], *47 (1909), II, No. 19, p. 603*).—A continuation of studies previously referred to (E. S. R., 21, p. 415), tending to show that the summer temperature of various places in Europe may be predicted by the previous winter temperature at Thorshavn and Upsala.

On the laws of evaporation, P. Vaillant (*Compt. Rend. Acad. Sci.* [*Paris*], *150 (1910), No. 4, pp. 213–216; abs. in Rev. Sci.* [*Paris*], *48 (1910), I, No. 6, p. 186*).—Experiments with partially covered surfaces are reported showing that the rapidity of evaporation is considerably influenced by the state of the surface of the liquid.

The effect of drainage work in northern Iowa on the flood stages of the rivers, A. Marston (*Mo. Weather Rev., 37 (1909), No. 12, pp. 1046, 1047*).—Briefly reviewing the drainage work which has been done in this region, the author concludes that "first, the probable effect of the construction of drainage ditches alone without tile drainage is to decrease the ordinary flow of streams and increase the flood flow; second, the probable effect of tile drainage is to increase the ordinary and low water rate of flow of streams and decrease the flood flow; third, the combined effect of drainage ditches and tile drainage will

probably be to cause a temporary increase in the rate of flood flow, and, eventually, a permanent decrease in the rate of flood flow."

Note on subsoil water in Egypt, H. T. FERRAR (*Cairo Sci. Jour., 3 (1909), No. 28, pp. 1–4, dgms. 2*).—These notes are based upon a series of observations made by means of experimental wells in a number of localities, mainly in Upper Egypt. These observations showed a close relation between the flood stage of the Nile and the level of the water table in the soil. "In the basin lands the range of fluctuation amounts to as much as 6 or 7 meters, in the perennially irrigated areas it is only 3 or 4 meters, while in Lower Egypt it is still less and is seldom more than a meter and a half. . . . The rise does not take place until some 45 days after the Nile has begun to rise and the water of these wells continues to rise for about the same number of days after the crest of the flood has passed."

Further notes on subsoil water in Egypt, H. T. FERRAR (*Cairo Sci. Jour., 3 (1909), No. 39, pp. 291–294, dgms. 2*).—The observations reported in this article were made in a number of experimental tube wells in the Province of Gharbia in Lower Egypt, where the land is irrigated perennially. The results show that the conditions in Lower Egypt are almost the reverse of those in Upper Egypt (see above) in that while the annual rise of the underground water due to the Nile flood may be recognized in some of the wells, "the greater number seem to be influenced by artificial irrigation more than by the natural fluctuation of the subsoil water."

Pure water (*Mo. Bul. N. Y. State Dept. Health, 26 (1910), No. 1, pp. 3–27*).—This is a series of short special articles dealing with the question of keeping water supplies pure or purifying polluted waters.

The papers and their authors are as follows: The Department's Policy—Past, Present, and Future, by E. H. Porter; Our Laws to Prevent Pollution of Streams, by A. H. Seymour; Disease from Impure Waters, by W. A. Howe; Responsibility of the Small Community in Preventing Stream Pollution, and Sewage Disposal of the Community, by T. Horton; Sewage Disposal of the Individual Residence, Country Home, and Camp, by H. B. Cleveland; Inspection of Watersheds, by H. N. Odgen; Laboratory Control of Water Supplies, by W. S. Magill; and The Effects of Water Pollution as Reflected in Vital Statistics, by F. D. Beagle.

A convenient portable apparatus for measuring the electric conductivity of waters, sewage, and salt solutions in place, M. PLEISSNER (*Wasser u. Abwasser, 2 (1910), No. 6, 249–256, figs. 3*).—Apparatus based upon the use of an alternating current, a Wheatstone bridge, and a telephone is described.

SOILS—FERTILIZERS.

On the chemical decomposition of rocks, J. DUMONT (*Compt. Rend. Acad. Sci. [Paris], 149 (1909), No. 26, pp. 1390–1393; abs. in Rev. Sci. [Paris], 48 (1910), I, No. 2, p. 61*).—A study of the action of carbon dioxid, pure water, hydrochloric acid, and calcium chlorid on the decomposition of certain rock types is reported.

The results showed that pure rocks reduced to a powder were very slowly attacked by acid or saline solutions. The limit of solution was very small and was directly dependent upon the fineness of the material and the degree of change which it had previously undergone. It was observed that notwithstanding the effects of long continued culture the sandy particles of soil had preserved their mineralogical character to such a degree that a cultivated soil examined under the microscope seemed to be a rock powder, the particles of which were cemented together by a relatively small quantity of mineral and humic colloids.

Yellow laterite and its parent rock, E. C. J. MOHR (*Bul. Dept. Agr. Indes Néerland., 1909, No. 28, pp. 1–12, pl. 1*).—Chemical studies of unaltered andesite and of the yellow crust forming on the surface of this type of rock under the influence of weathering are reported.

Soils in the vicinity of Brunswick, Ga.: A preliminary report, H. H. BENNETT (*U. S. Dept. Agr., Bur. Soils Circ. 21, pp. 21*).—This is a report of a preliminary survey of this region with a view to ascertaining its crop adaptations and capabilities. It describes briefly the agriculture, climate, and typical soils of the area. The latter include Portsmouth loam, fine sand, clay, and mucky loam, Coxville fine sandy loam, Amelia fine sand, Congaree clay and mucky sandy loam, and peat.

The Portsmouth series of soils are "the poorly drained dark gray to black lands of high organic matter content; . . . the well drained gray to nearly white deep sandy lands of low humus content are classed as Amelia; the gray to dark gray types underlain by plastic clay of mottled yellow and red color belong to the Coxville series; and the river bottom lands belong to the Congaree series." The crop adaptations of the different soils are noted.

Soils of the Kirghiz Steppe, N. TULAIKOV (*Pochvui Kirghizskoĭ Stepī. Moscow, 1907, pp. 95; rev. in Zhur. Opuitn. Agron.* (*Russ. Jour. Expt. Landw.*), *9* (*1908*), *No. 5, pp. 628–630*).—The characteristic soils along the proposed railroad from Aktubinsk to Semipalatinsk are described, the main types included being chernozem, chestnut, light gray, sandy, and alkali soils. The latter are grouped in three classes, (1) those formed from salt-bearing rocks, (2) those occurring in the beds of dried up lakes, and (3) those occurring in river valleys. The lake bottom soils contain considerable amounts of salts (1.8 to 5.3 per cent), largely chlorids. The amount of soluble salts in the river valley alkali soils varies widely but is sometimes as high as 19 per cent, chlorids and sulphates being the predominating constituents. Carbonate alkali rarely occurs.

[Analyses of soils], W. R. S. LADELL (*Natal Agr. Jour., 13* (*1909*), *No. 5, pp. 656, 657*).—Chemical analyses of 26 samples of soils from different parts of Natal are reported.

Evaporation from water and soil surfaces, E. C. J. MOHR (*Bul. Dept. Agr. Indes Néerland., 1909, No. 29, pp. 12, figs. 2*).—The relative rate of evaporation from water and soil surfaces was studied with a series of cylindrical zinc dishes 3 cm. deep and having a surface area of 100 sq. cm. Some of the dishes contained soils of different kinds. Each received 200 cc. of water and all were exposed to the free air and weighed from time to time to determine evaporation.

The results show that evaporation was uniformly higher from a water surface than from the surface of either a wet or only moist soil. At the beginning evaporation was greater from the soil and later became still greater, but finally decreased until it was less than from the water surface.

A study of the production and movement of nitric nitrogen in an irrigated soil, R. STEWART and J. E. GREAVES (*Utah Sta. Bul. 106, pp. 69–96*).—The results of investigations on this subject during the years 1903 to 1907, inclusive, are reported in this bulletin, with a brief review of the work of other investigators along similar lines.

The investigations were carried on on the station farm on which the soil is of a sedimentary nature derived from the weathering of limestone rocks of a near-by mountain range. Physical and chemical analyses of each foot of the soil down to a depth of 8 ft. are reported as well as determinations by essentially the King method (E. S. R., 13, p. 229) of nitric nitrogen in extract from samples of the soil from differently treated plats down to a depth of 10 ft.

The bulletin also contains the results of a study of the influence of chlorids upon the accuracy of the determination of nitric nitrogen by the King method and a study of the composition of the irrigation water used on the various plats. Some of the plats were uncropped, others were planted to alfalfa, sugar beets, potatoes, corn, and oats. No attempt is made to draw definite conclusions from the data, but some facts of importance are brought out.

It was found that nitric nitrogen tends to accumulate in the lower sections of the soil during winter and spring and that the application of irrigation water carries the nitric nitrogen to a large extent below the reach of the roots of the plants. There was an especially low concentration of nitric nitrogen in land bearing alfalfa. Cultivated fallow soil contained more nitric nitrogen at the end of the irrigation season than uncultivated fallow, but in the fall there was little difference in the nitric nitrogen content in the cultivated and uncultivated plats. The average amount of nitric nitrogen at the close of the spring period during three years was 142 lbs. per acre in soil on which corn was grown, 98 lbs. per acre on potato land, 27 lbs. per acre on alfalfa land, and 165 lbs. on fallow land.

"In the corn land the average before irrigation was 144 lbs. per acre, while after irrigation it was 104 lbs. per acre; in potato land the average before irrigation was 110 lbs. per acre, while after irrigation it was 94 lbs. In the alfalfa land before irrigation the average was 34 lbs., while after irrigation it was 38 lbs.; in the fallow plats the average was 174 lbs. before irrigation, and 130 lbs. after irrigation. During the fall period we have the same result; in the corn land there were 63 lbs. per acre; in the alfalfa land there were 32 lbs. per acre; while in the fallow land there were 151 lbs. per acre."

The figures show that the different plants make very different demands upon the nitric nitrogen of the soil. There was a steady decrease in the nitric nitrogen content of potato and corn land from period to period, but that of alfalfa and fallow land remained nearly constant. The nitric nitrogen disappeared rapidly from oat land during the last few weeks of the growth of the plant.

"The nature of the season apparently has a marked effect on the results obtained. In 1905 the application of irrigating water caused a decrease in the nitric nitrogen content of soil on which potatoes were growing, while in 1906 exactly the opposite was true, there being an increase in every case."

Organic nitrogenous compounds in peat soils, S. L. Jodidi (*Michigan Sta. Tech. Bul. 4, pp. 28, fig. 1*).—The nitrogenous decomposition products which have been discovered and identified by earlier investigators are enumerated and the details of a study by the author of different samples of Michigan peat by methods essentially the same as those ordinarily employed in the chemical study of protein compounds are reported and form the basis of the following conclusions:

"There are no nitrates in the types of Michigan peat soil examined.

"The amount of ammonia is small, ranging from a few thousandths to a few hundredths of one per cent, this representing the nitrogen available immediately as plant food. In the case of the brown peat, the amount of ammonia is sufficient to meet the needs of one or two crops, as is evident from the following: There are in an acre-foot in round numbers 170 tons of oven-dried peat, with 0.041 per cent ammoniacal nitrogen, making 0.0697 ton or 139.4 lbs. nitrogen as ammonia.

"Practically all the nitrogen in the peat is of organic nature.

"The bulk of the organic nitrogen, namely, from two-thirds to three-quarters calculated upon the nitrogen in solution, by boiling with acids, is present in

the form of monamino acids, about one-quarter in the form of amids, and the rest of the nitrogen represents diamino acids.

"Through weathering, the organic nitrogenous bodies present in the brown peat change quite slowly."

Organic nitrogenous compounds in peat soils, S. L. Jodidi (*Jour. Amer. Chem. Soc., 32 (1910), No. 3, pp. 396–410*).—A briefer account of the investigations noted above.

On the fertility of soils with regard to phosphoric acid, A. Kostzyelyetzkii (*Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 10 (1909), No. 4, pp. 449–483*).—This is a further and more detailed account of investigations which have already been briefly referred to (E. S. R., 22, p. 424), indicating that the growth of *Aspergillus niger* in nutritive solutions furnishes an index of the amount of phosphoric acid present. It was found that phosphoric acid constitutes about 1/200 part of the weight of the mycelium of this fungus.

Experiments are reported which were undertaken to determine the age at which the mycelium completes its growth as well as the percentage of phosphoric acid in the full-grown mycelium. It was found that when the minimum of phosphoric acid (not exceeding 0.025 per cent) was used the Aspergillus completed its growth in 18 days and was capable of absorbing the total amount of phosphoric acid present in this time. The results obtained with the Aspergillus agreed closely with those obtained by extracting podzol soil with citric acid and chernozem soil with oxalic acid.

Various conditions affecting the growth of the Aspergillus were studied and are reported upon.

The plant food minimum and phosphoric acid, J. P. Wagner (*Deut. Landw. Presse, 36 (1909), Nos. 43, pp. 459, 460, figs. 2; 44, pp. 472, 473; 45, pp. 483, 484, figs. 2; 46, pp. 491, 492; abs. in Zentbl. Agr. Chem., 38 (1909), No. 12, pp. 804, 805*).—The author explains the importance of evenly balanced fertilizing and discusses the cheapest and simplest means of correcting soil deficiencies in plant food with particular reference to deficiencies in phosphoric acid. The discussion is based upon and illustrated by results obtained with varying amounts of Thomas slag in connection with other fertilizing materials on a large number of different kinds of soils in Alsace-Lorraine, Luxemburg, and Rheinfalz during 1907 and 1908. While the results are mainly of local importance they show that, as a rule, Thomas slag can be freely used even in excess of the requirements of a given crop with reasonable assurance of ultimate profit.

Contribution to investigations on the utilization by plants of plant food occurring in minimum, E. A. Mitscherlich and K. Celichowski (*Landw. Jahrb., 39 (1910), No. 1, pp. 133–156*).—This is a continuation of previous experiments (E. S. R., 22, p. 223), and gives the results and conclusions from pot experiments with oats grown in sand with phosphoric acid in minimum.

The results of the experiments showed in general that with like conditions of growth the percentage utilization of the carbon dioxid soluble plant food in minimum was the same. It was not dependent upon the amount of the plant food supplied. Since, according to the law of minimum, the yield of the plant increases in logarithmic function with the amount of fertilizer applied, it follows that the plant yield increases in logarithmic function with the amount of plant food in minimum which is assimilated.

Under like conditions of growth the percentage utilization of a plant food in minimum varies when the plant food is supplied in two fertilizers varying in solubility. The percentage content of plant food in the plant also varies under such conditions, that is, with the same yield there may be a very different percentage of the plant food in minimum in the plant. The percentage increase in

this content is proportional to the amount of plant food in the soil soluble in carbon dioxid. The amount of plant food taken up is the same as that which is soluble under like conditions in water containing carbon dioxid. Under varying conditions of growth, for example, in climate and soil, which affect the solubility, the percentage utilization of the given plant food is also changed, but it is independent of the amount of the plant food applied.

To what extent can fertilizer action be replaced or strengthened by the work of bacteria? P. Ehrenberg (*Jahrb. Deut. Landw. Gesell., 24 (1909), No. 4, pp. 915–926*).—This is a popular review of investigations by the author and others tending to show that the action of fertilizers may be materially modified by bacterial activity in the soil.

On the decomposition of stable manure, B. Heinze (*Abs. in Centbl. Bakt. [etc], 2. Abt., 25 (1909), No. 19–25, pp. 503, 504*).—It is stated that the thorough decomposition of stable manures in the stall and in the heap greatly increases its efficiency as a fertilizer. This decomposition not only increases the availability of the fertilizing constituents of the manure but also improves it as a food for micro-organisms in the soil.

The contents of the fertilizer sack, C. E. Thorne (*Ohio Farmer, 125 (1910), No. 6, pp. 1, 26*).—The nature and sources of the principal constituents of fertilizers and the mixing of fertilizers of desired composition are discussed.

The use of commercial fertilizers as top-dressing, Bannert (*Jahrb. Deut. Landw. Gesell., 24 (1909), No. 4, pp. 926–934*).—The practical experience of a number of farmers is summarized.

The cost of available nitrogen, E. B. Voorhees (*New Jersey Stas. Bul. 224, pp. 14–19*).—This article discusses the relative availability of nitrate, ammonical, and organic nitrogen with special reference to the commercial and agricultural value of the principal materials furnishing these different forms of nitrogen. It is shown that while the organic forms of nitrogen are less available than the nitrate or ammonical nitrogen they at present cost more in the market.

The nitrate deposits of Chile, R. A. F. Penrose, Jr. (*Jour. Geol., 18 (1910), No. 1, pp. 1–32, figs. 7*).—This article discusses the location and natural features of the nitrate regions, the history of the nitrate mining industry, the mode of occurrence and materials composing the nitrate deposits in the Tarapacá region, industrial features in the Tarapacá nitrate region, other nitrate regions in Chile and nitrate deposits elsewhere than in Chile, and the origin of the Chilean deposits.

It is stated that "almost all the nitrate of Chile is in the great arid basin lying between the Andes and the coast ranges, in the provinces of Tarapacá and Antofagasta." Smaller deposits are found to the north and south of these provinces.

The author considers derivation from organic matter, and especially guano, as the most probable hypothesis regarding the origin of these deposits. The nitrate mining industry is comparatively recent in origin. In 1830 the production was 8,348 long tons. During the year ended March 31, 1909, it was about 1,808,986 long tons. It is stated that the nitrate being mined at present is very wastefully treated and a large percentage of it is left in the refuse material accumulating around the factories. "Thus low-grade nitrate materials are gradually accumulating in immense amounts, and may be used in the future when more economical methods are introduced. These materials, together with the possible new discoveries of nitrate, render the future of the industry in Chile much more hopeful than some of the pessimistic prophets would lead us to believe; and for very many years to come Chile will doubtless be capable of supplying nitrate to the world."

California nitrates (*Amer. Fert., 32 (1910), No. 2, p. 16*).—Niter beds which are being exploited in the extreme eastern part of San Bernardino County, Cal., about 32 miles south of Needles, are described. Analyses of 4 samples of the nitrate-bearing clay are reported, showing from 7.2 to 22.6 per cent of sodium nitrate.

Sulphate of ammonia in 1909, MAIZIÈRES (*Engrais, 25 (1910), No. 3, pp. 69–71*).—The world's production in 1909 is estimated at 968,700 metric tons, of which England produced 348,000 tons, Germany 340,000, and France 53,600. Statistics are also given showing the distribution of the sulphate in different countries.

Nitrate of ammonia production, R. P. SKINNER (*Daily Cons. and Trade Rpts. [U. S.], 1910, No. 3700, p. 6*).—This is a brief statement regarding methods of manufacture and prices current in Germany for this material.

Experiments with new nitrogenous manures, 1904–1908, J. HENDRICK (*Aberdeen and No. of Scotland Col. Agr. Bul. 13, pp. 29; abs. in Mark Lane Express, 103 (1910), No. 4089, pp. 137, 139*).—The need of additional nitrogenous fertilizers is discussed; the manufacture, properties, and agricultural value of calcium nitrate and calcium cyanamid are briefly described; and experiments with these two materials in comparison with nitrate of soda and sulphate of ammonia extending over several years are reported. The experiments included field tests with oats, barley, and turnips, and pot tests with oats. The nitrogenous fertilizers were used at rates furnishing equal amounts of nitrogen, and always in connection with the same application of potash salts and superphosphates.

The results show that both calcium cyanamid and calcium nitrate were active and effective fertilizers, the calcium cyanamid being equal to nitrate of soda or sulphate of ammonia as a fertilizer for grain crops, and the nitrate of lime rather more effective than nitrate of soda, sulphate of ammonia, or calcium cyanamid. It is thought probable that the higher efficiency of the calcium nitrate was due to the lime and that the results might be different on soils well supplied with lime. With applications of about 1 cwt. per acre there was no noticeable injury to germination by applying the cyanamid at the time of seeding. It was found that neither calcium cyanamid nor calcium nitrate is suitable for mixing with soluble phosphates. Calcium nitrate is so hygroscopic that it requires to be protected from the air when stored and is not suitable for use in ordinary fertilizer mixtures. Calcium cyanamid, however, may be safely mixed with basic slag, bone meal, and potash salts, although such mixtures become hard and lumpy after a time. The best method of applying calcium nitrate is as a top-dressing.

Observations are reported showing that the percentage of nitrogen diminishes in calcium cyanamid during storage. In one case it fell from 17.4 to 13.6 per cent, while the weight of the material increased about 16.8 per cent. The fall in percentage of nitrogen, therefore, was mainly due to increase in weight.

On artificial nitrogenous fertilizers derived from the air.—Lime nitrogen, nitrogen lime, and calcium nitrate, and their importance in practical agriculture, B. HEINZE (*Abs. in Centbl. Bakt. [etc.], 2. Abt., 25 (1909), No. 19–25, pp. 502, 503*).—The importance of stable manure and green manure is pointed out, the frequently observed superiority of nitrate of soda over sulphate of ammonia as a nitrogenous fertilizer is explained, and the fertilizing value of the new nitrogen compounds, calcium nitrate and calcium cyanamid, in comparison with sodium nitrate and ammonium sulphate is discussed.

It is pointed out that calcium nitrate is less likely to form a hard crust on clay soils than sodium nitrate. Attention is called to possible injury from

calcium cyanamid due to changes which that compound undergoes in the soil under chemical or biological action. The author states that calcium cyanamid can be used to better advantage on potatoes and on cereals than on beets, the potato being especially benefited by ammonium compounds, the beet by nitrates. The cyanamid is not considered at all suited for acid humus soils and light sandy soils.

The electrochemical manufacture of nitric acid and nitrogen compounds from the air, J. ESCARD (*La Fabrication Électrochimique de l'Acide Nitrique et des Composés Nitrés a l'Aide des Eléments de l'Air. Paris, 1909, 2. ed., pp. 115, figs. 52*).—This treatise reviews the industrial and economic importance of nitrogen compounds, the exhaustion of known nitrate deposits, technical considerations relating to the rôle of electricity in the electrochemical preparation of nitric acid, methods used, particularly the Birkeland and Eyde process for the preparation of calcium nitrate and the various processes proposed for the preparation of calcium cyanamid, and high yielding niter beds. The various steps in the preparation of calcium nitrate and calcium cyanamid, the increase in the use of nitrate of soda since 1830, and the comparative use of nitrate in different European countries are shown diagrammatically. Attention is also called to the proposed utilization of peat, not for the direct production of nitrates, but for the production of energy and by-products by distillation.

The nitrate industry of Norway, L. GRANDEAU (*Jour. Agr. Prat., n. ser., 19 (1910), No. 2, pp. 44–46*).—This article summarizes briefly the latest information with reference to production, fertilizing value, properties, and cultural use of calcium nitrate as manufactured by the Birkeland and Eyde process at Notodden, Norway.

[Manufacture of nitrate in Norway] (*Engrais, 25 (1910), No. 3, pp. 79–81*).—Data are given regarding the present status of this industry.

Production, properties, and use of the principal potash salts, P. KRISCHE (*Mitt. Deut. Landw. Gesell., 25 (1910), Nos. 2, pp. 20, 21; 3, pp. 33–36*).—The different potash salts mined and used in Germany are described with data as to production, consumption, and price.

Kainit, its production, properties, and importance in German agriculture, P. KRISCHE (*Fühling's Landw. Ztg., 58 (1909), No. 24, pp. 890–897*).—Statistics are given of the consumption of potash in Germany, the kainit and associated salts in natural potash deposits are described, and the market price of kainit as compared with other salts is discussed.

Thomas and Martin slags, A. OTRUIGHAN'EV (*Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 10 (1909), No. 5, pp. 609–659, figs. 5*).—Results of several years' pot and field experiments with these slags in comparison with other phosphates showed that Thomas slag is a very effective fertilizer for the lighter soils, on peat, and in general, on more or less acid soils. In these cases it was more effective than superphosphate. The slag acts more slowly than superhposphate and not infrequently exerts almost no influence on the first crop, but acts more strongly on the second, third, and often later crops. It is especially suited to use on meadows, on winter rye, and on cereals followed by grasses. For summer cereals superphosphate is considered in general more suitable. Martin slag gave results somewhat inferior to those obtained with Thomas slag.

The process of making these slags is described and analyses of the materials used and the products obtained are given.

Something new in the field of phosphatic fertilizers, A. MENOZZI (*Agr. Mod., 15 (1909), No. 52, pp. 715–718*).—The novelty in question is calcium pyrophosphate, made by heating raw phosphate with sulphur dioxid in the

presence of air. The resulting product is a fine, white, dry powder. The reaction is slightly alkaline and the total phosphoric anhydrid is 26.5 per cent.

A pot experiment with millet comparing ordinary superphosphate, pyrophosphate, and slag showed that the pyrophosphate gave a slightly smaller return in grain than either of the other materials and a considerably larger yield of straw than the slag but slightly smaller than the superphosphate.

The advantages claimed for the new product are that it is better suited to acid soils, the process of manufacture is simpler and cheaper, and it is much less difficult to handle.

Plant, phosphorite, and soil according to experiments in the Agricultural-Chemical Laboratory of St. Petersburg, P. Kossovich (*Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 10 (1909), No. 6, pp. 782–842, figs. 17*).—Pot experiments to determine the utilization of the phosphoric acid of Jura phosphorites under varying conditions of soil and plant, extending over a number of years, 1898 to 1908, are reported in detail. The plants experimented with were mustard, red clover, oats, and flax. Data are given not only for the yield but also for the phosphoric acid content of the seed and straw.

The oat plant was found to be most resistant to an excess of acidity or alkalinity in the soil. Flax and red clover were decidedly affected by the reaction of the soil, the first being especially sensitive to alkalinity, the second to acidity. Mustard withstood alkalinity well, but was decidedly affected by acidity.

With a deficiency of phosphoric acid mustard showed the smallest capacity for utilizing the soil phosphoric acid. A slightly greater capacity in this respect was shown by red clover, but a much higher capacity by oats and flax.

The behavior of the different plants toward the phosphoric acid of phosphorite was entirely different from that toward the soil phosphoric acid. In this case the mustard showed the highest assimilative capacity and was able to utilize the phosphoric acid of phosphorite to a considerable extent and with a marked increase in yield. The addition of calcium carbonate to the soil and the absence of acidity reduced the assimilative capacity of mustard to only a slight extent. The largest amount of phosphoric acid was assimilated by the mustard from phosphorite in a light sandy acid chernozem soil. Oats and flax utilized the phosphoric acid of phosphorite to a much less extent than mustard. Clover showed a greater assimilative capacity than oats, and the smallest capacity was observed in the case of flax. All of these plants, however, showed marked assimilation of the phosphorite only in soils which were decidedly acid. In soils which were not acid or which had been neutralized by the application of lime the assimilation of the phosphoric acid of the phosphorite was almost inappreciable.

The capacity for assimilating difficultly soluble phosphoric acid not only varied with different plants but also with the same plant, depending upon the source of the phosphoric acid, whether from the soil or from phosphorite.

The results show in general that the question is complicated by a variety of factors which require further investigation.

The mining of phosphate with special reference to Florida phosphate, O. Grothe (*Technologist, Mitt. Deut. Amer. Tech. Verbandes, 15 (1910), No. 1, pp. 1–8*).—The extent, character, and methods of mining the phosphate are briefly described.

The western phosphate lands, M. S. Duffield (*Conservation, 15 (1909), No. 11, pp. 686–688*).—This article refers to the withdrawal from entry by executive order of lands in Utah, Idaho, and Wyoming supposed to contain phosphate,

urges the importance of the conservation of phosphates, and calls attention to certain legislation pending in Congress regarding this matter.

Rational use of lime on land, A. AGEE (*Penn. Dept. Agr. Rpt., 14 (1908), pp. 368–371; Bul. 177, pp. 68–71*).—An attempt is made to show that the tendency of soils is toward lime deficiency. Even limestone soils gradually lose available lime, and maximum crops can only be obtained on alkaline soils. As soils grow old more and more lime is required to keep them sweet.

Fertilizing with carbon dioxid, E. A. MITSCHERLICH (*Landw. Jahrb., 39 (1910), No. 1, pp. 157–166*).—Pot experiments with oats grown on sandy humus loam and moor soils are reported. Various fertilizer combinations were used and in certain series of the experiments the soils were treated with water saturated with carbon dioxid.

The results showed that no increase in yield followed an increase in the carbon dioxid content of the soils. Apparently the soil is so well supplied with carbon dioxid excreted by the plant roots or derived from the decomposition of humus substances that a further addition of this substance does not increase the solubility and utilization of the soil constituents.

Inspection and analyses of cotton-seed meal on sale in Mississippi, W. F. HAND ET AL. (*Mississippi Sta. Bul. 127, pp. 47*).—This bulletin summarizes the results of inspection of cotton-seed meal offered for sale in Mississippi during the season of 1908–9, and discusses the comparative value of different grades of meal. The analyses show "that some manufacturers supply an excellent product on a guaranty of 6.18 per cent nitrogen, while others make an effort to sell a meal containing only a small margin over 6.18 per cent. In endeavoring to keep this margin within reasonable limits cases are numerous in which meals guarantied to contain 6.18 per cent nitrogen carry from about 5.8 to 6.18 per cent and more."

Report on commercial fertilizers, 1909, E. H. JENKINS and J. P. STREET (*Connecticut State Sta. Rpt. 1909–10, pt. 1, pp. 117+VIII*).—The results of inspection of 737 samples of commercial fertilizers and miscellaneous fertilizing materials, including factory-mixed and home-mixed fertilizers and standard and miscellaneous fertilizing materials, are reported. The miscellaneous materials of which analyses are reported include limekiln ashes, lime, calcium carbonate, soot, pulverized sheep manure, tobacco stems and tobacco dust, salt waste, plaster, lava fertilizer, and peat or swamp muck.

Inspection and analyses of commercial fertilizers on sale in the State, W. F. HAND ET AL. (*Mississippi Sta. Bul. 126, pp. 95*).—This is the complete report on inspection of fertilizers in Mississippi during the season of 1908–9, partial reports having been previously noted (E. S. R., 21, p. 125), and contains analyses and valuations of 880 samples of fertilizers and fertilizing materials.

Discussing the quality of fertilizers sold in the State, the bulletin warns farmers against the purchase of low-grade fertilizers. The analyses show that very few of the fertilizers examined were deficient as much as 6 per cent in relative commercial value, but "it appears evident that a few manufacturers are operating on close margins, and as long as this is the case unsatisfactory results can not be prevented."

The most marked deficiencies observed were in nitrogen. "It is true that the excess in phosphoric acid in very many cases prevents a too great depression in relative commercial values when nitrogen determinations are low, but a compensation of this kind is allowable to only a limited extent. The essential character of a fertilizer ought not to be modified even though the final results give a value equal to the guaranty."

Analyses and valuations of commercial fertilizers and ground bone, C. S. Cathcart et al. (*New Jersey Stas. Bul. 224, pp. 3–14, 20–46*).—This bulletin supplements a previous bulletin (E. S. R., 22, p. 228) on fertilizer inspection in New Jersey during 1909, reporting later analyses and discussing the results of inspection as a whole. It also contains a special article on the cost of available nitrogen (see p. 620).

The work of the year involved analyses of 762 samples of fertilizers and fertilizing materials. The 483 brands of complete fertilizers examined represented the product of 108 manufacturers and jobbers. This indicates an excessive multiplication of brands.

Taking the average of all analyses the brands fully satisfied the guaranties made by the manufacturers, but there were many cases of individul deficiencies. A very large proportion of the brands were deficient in phosphoric acid. "In the brands examined there was a total of 1,449 deficiencies possible and of this number 244, or 16.8 per cent, were actually found. These deficiencies were distributed among 203 brands, 166 of which were deficient in one element, 33 in two elements, and 4 in all three of the elements. . . . The deficient brands do not show evidences of intentional inferiority, but rather the result of bad mixing, and, in such cases, where there is a slight deficiency in one element and a corresponding increase in another, no hardship is imposed upon the consumer, assuming that he obtains an equivalent of fertility value."

Of the brands examined 71 were deficient in nitrogen, 137 in phosphoric acid, and 36 in potash. The average composition of the fertilizers examined shows that the nitrogen content was increased 0.23 per cent and the potash content 0.27 per cent, while the three different forms of phosphoric acid were practically the same, when compared with the averages for last year.

"The average valuation was $1.16 per ton lower than last year, and the selling price was $1.08 higher. The difference between the selling price and station's valuation was $8.54 per ton, which represents the overhead charges on the material."

During 1909 the consumer received "in one ton of fertilizer 96 cents' worth more of plant food than he did last year and . . . it cost him $1.08 more to get it." It is shown that the lower the grade of fertilizer the greater the cost of actual plant food.

Analyses of commercial fertilizers, M. B. Hardin (*South Carolina Sta. Rpts. 1907, pp. 11–15; 1908, pp. 13–18*).—The results of fertilizer inspection during the years ended June 30, 1907 and 1908, are briefly summarized.

[Amount and price of fertilizers used in Germany, 1903 to 1908] (*Jahrb. Deut. Landw. Gesell., 24 (1909), No. 4, pp. 1025–1028*).—Detailed statistics are given for the different provinces of Germany.

AGRICULTURAL BOTANY.

Application of some of the principles of heredity to plant breeding, W. J. Spillman (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 165, pp. 74, figs. 6*).—This paper is designed to set forth what is known of the effects of selection on different types of plants and the possibilities of cross-breeding for the purpose of producing new varieties. In general, it is a discussion of the technical terms and laws relating to plant breeding that have been evolved from Mendel's theory.

The mutation theory, H. de Vries, trans. by J. B. Farmer and A. D. Darbishire (*Chicago, 1909, vol. 1, pp. XVI+582, pls. 6, figs. 119*).—This is an English edition of the author's work Die Mutationstheorie, which appeared several years ago. The present volume is confined to a discussion of the ex-

periments and observations on the origin of species in the vegetable kingdom. A second volume will treat of the origin of varieties. Some additional material has been included to bring the subject up to date.

In the present work a discussion is given of the principles of the current theory of selection, after which the author's investigations on the origin of elementary species in the genus Œnothera are described at length. An extended discussion is given of the relative influence of nutrition and selection on various characters, and it is shown that these two factors influence the plant in the same direction, and when brought into conflict sometimes one and at other times the other predominates.

This translation will be found of great value to students and investigators of plant and animal breeding to whom the author's earlier work is not available.

The origin and relationship of new varieties of cereals, F. Körnicke (*Arch. Biontol., 2 (1908–9), No. 2, pp. 390–437*).—The results of a botanical study of the various species, varieties, and races of Triticum, Hordeum, and Avena are given, with some notes on varieties of Panicum and maize.

The wild type of the cultivated potato, P. Berthault (*Compt. Rend. Acad. Sci. [Paris], 150 (1910), No. 1, pp. 47–50*).—The results of a study of a large number of varieties of cultivated potatoes, wild species in cultivation, and herbarium material have convinced the author of the impracticability of determining from them the specific origin of our cultivated potato. He subjected some of the wild species, especially *Solanum commersonii*, to the conditions which are supposed to induce mutations, but thus far he has been unable to recognize any specific modifications.

The transmission of variations in the potato in asexual reproduction, E. M. East (*Connecticut State Sta. Rpt. 1909–10, pp. 119–160, pls. 5*).—In a previous paper (E. S. R., 20, p. 533) the author presented data which he thought justified the conclusion that asexual fluctuations in case of the potato were not inherited. Other investigations made it desirable to repeat his work, eliminating as far as possible all experimental error.

In 1906 a number of foreign and domestic varieties of potatoes were gathered together to observe the frequency with which differentiations occurred within a variety reproduced by tubers. In 1907 other varieties were added until over 700 commercial varieties of potatoes were under investigation. Observations were made upon this stock in 1906, 1907, 1908, and 1909. Among the unnamed seedlings was one grown from seed of Early Rose, probably self-fertilized, that had certain marked characteristics which made it valuable for study. This was propagated and a considerable amount of material obtained for study.

The fluctuation in dry matter and nitrogen content as due to high or low nitrogen content in the seed tuber was investigated, and the author concludes that neither the relative content of dry matter nor that of the nitrogen in the potato can be changed by the selection of fluctuations and their subsequent asexual reproduction. Studies were also made on the fluctuations in yielding power, and it seems impracticable to recommend asexual selection to commercial growers as a means of actual improvement of the crop.

As a result of experiments as to the power of resistance to drought, disease, and other external influences, while the author does not claim that the power of resisting physiological or fungus diseases does not occur in asexual reproduction, he believes that the relative probability that the commercial grower will obtain disease-resistant varieties by this means is negligible. In most cases investigated, so-called resistance within a variety is believed to be due to non-infection, and when there is a marked difference in vitality it is probably due to differences in maturity, size of seed piece, varying soil fertility, or other causes.

In another paper (E. S. R., 20, p. 325) the author has called attention to the infrequency of bud variations. A further study has afforded no reason to change his opinion that practically all, if not quite all, bud variations are losses of a dominant or an epistatic character allowing the appearance of a recessive or a hypostatic character. The experiments on which this opinion was based involved investigations as to change of color, shape, depth of eyes, and habit of growth.

A series of attempts was made to produce variations through grafts, such variations having been reported. More than 100 attempts were made to graft buds of white and colored tubers, in each case the bud being cut in half at its vertical point and two grafted buds brought together. It was found that the new plant was always formed from the growing tissue of one variety. A second experiment, consisting of inserting a bud cut from a tuber of a colorless variety into a hole of the same size in a colored one, and vice versa, gave results which indicated that there was absolutely no influence of the stock upon the plant. From his experience the author is led to believe that many of the so-called graft hybrids were plants exactly like the stock, produced from it by unnoted adventitious buds.

In summing up his investigations the author states that the behavior of variations reproduced by budding is in many ways essentially like that of variations coming from seed. Of the variations found all but one have concerned characters that mendelize in sexual reproduction, and as there is no evidence of inheritance in the case of this one exception, it may be left out of consideration. Considering the fact that in the large amount of material under observation only 12 inherited variations have been observed, a rather high rate of frequency, there is believed to be no reason to recommend asexual selection as a commercial means of actual improvement, as no changes of commercial value have been found.

In conclusion the author states:

"The classification of all of the permanent bud variations as losses of characters shows the investigation of the possible inheritance of fluctuations in composition in a new light. Since the variety used in the investigation was recessive in all the characters whose behavior in sexual reproduction is known, less probability exists that an inherited change might take place that would obscure the results on the class of variations immediately concerned. This being the case, we may feel some confidence in a conclusion that fluctuations (variations due to surrounding conditions) are not inherited. Furthermore, there is little doubt but that the cases of so-called disease resistance should be classed as noninherited fluctuations due to various physiological causes."

A Mendelian interpretation of variation that is apparently continuous, E. M. East (*Amer. Nat., 44 (1910), No. 518, pp. 65–82*).—Some new facts of inheritance obtained from pedigree cultures of yellow and white varieties of maize are given, followed by a discussion of hypotheses to which an extension of this class of facts leads.

The facts have to do with the independent allelomorphic pairs which cause the formation of like or similar characters in the zygote. In certain cases the endosperm of the maize contains two indistinguishable, independent yellow colors, although in most yellow races only one color is present. There is also some evidence that there are three and possibly four independent red colors in the pericarp, and two colors in the aleurone grains. In 15 different varieties of yellow maize crossed with various white varieties, crosses were obtained that gave a simple monohybrid ratio, but in other cases a dihybrid ratio was the result. In certain cases there appear to be several allelomorphic pairs, each of which is inherited independently of the others, and each of which is

separately capable of forming the same character. When present in different numbers and in different individuals, these units simply form quantitative differences.

In the light of these added facts as to inheritance, the author believes that the word "mutation" may be applied to any inherited variation however small, while the word "fluctuation" should be restricted to those variations due to immediate environment which do not affect the germ cells and which are not inherited. This gives a rational basis for the origin of new characters which has heretofore been somewhat of a Mendelian stumbling block.

Color inheritance in Lychnis dioica, G. H. SHULL (*Amer. Nat., 44 (1910), No. 518, pp. 83-91*).—In the purple-flowered form of Lychnis it was observed that some of the flowers were of a blue-purple hue, and an effort is made by the author to determine the relationship of this color to the more common reddish-purple by crosses between the red and blue, using a single red-flowered individual as the mother in one series of crosses, and a single blue-flowered individual as the mother in another series. The same blue-flowered and red-flowered plants were also crossed at the same time with white-flowered plants. The actual and theoretical results of these eight crosses are given.

As a result of these experiments the purple color in *L. dioica* was found to be a compound color due to three distinct and independent genes in a manner exactly analogous to the similar colors in Lathyrus, Matthiola, etc.

Genetical studies on Œnothera, I, B. M. DAVIS (*Amer. Nat., 44 (1910), No. 518, pp. 108-115*).—The author makes a report on the behavior in the first generation of sets of hybrids obtained by crossing certain species of Œnothera. The characters of the parents as presented in each cross were so blended that as regards the measurements of parts, habit, texture of foliage, etc., the average for each set of hybrids would probably present a fair mean between the two parents. There was, however, a wide variation in the resemblance of the hybrids to one or the other of the parents. No dominant parental character was discovered in these hybrids.

Future methods of soil bacteriological investigations, H. J. CONN (*Centbl. Bakt.* [etc.], *2. Abt., 25 (1909), No. 14-18, pp. 454-457*).—The author claims that before any real advances can be made in soil bacteriology the bacterial flora of the soil must be properly classified by means of pure cultures and arranged in well-defined groups. A study must then be made of the effects of the recognized and significant species on the soil rather than on liquid culture media.

Studies on the micro-organism producing the legume tubercles, G. DE ROSSI (*Ann. Bot.* [*Rome*], *7 (1909), No. 4, pp. 617-669, pl. 1, fig. 1*).—The micro-organism producing the tubercles on the roots of leguminous plants is claimed to have been isolated, its microscopic, biological, and macroscopic characteristics described, and methods for using the organism in practical agriculture given. The organism was isolated by using for inoculation material water infusions of the contents of the bacteroids, plated on gelatin made from legume glucose, and then replated from the resulting individual colonies until a pure culture was obtained. The bacteria thus isolated were capable of producing nodules on the roots of various legumes, and the author claims that the micro-organism is not identical with *Bacillus radicicola* as described by Beijerinck.

Research on the proteolytic enzyms in fungi and bacteria, R. M. WILSON (*Notes Roy. Bot. Gard. Edinb., 1909, No. 21, pp. 27-37*).—Several species of fungi and bacteria were examined for proteolytic activity. Each species of the higher fungi was ground up in a mortar with water and sand into a thick paste which was diluted with water and then filtered. To the filtrate was added

absolute alcohol. The precipitate obtained was washed in alcohol and ether, filtered off and dried, and the enzymatic powder thus produced allowed to act on wheat protein, the nitrogen content of which was about 16 per cent. In each experiment 3 flasks were used, each containing the same quantity of protein, enzymatic preparation, and water. To one flask tannic acid and a trace of sodium acetate were added at once; the other flasks were allowed to stand for 24 hours at a temperature of 50° C., when they also received the same quantity of tannic acid and sodium acetate. The tannic acid precipitates the insoluble protein and the quantity of nitrogen remaining in the filtrate was assumed to represent the proteolytic activity of each enzym.

A direct test was made of some 12 species of the fleshy fungi, using the juice pressed from fresh plants and allowing it to act on the wheat protein for 4 hours at 50° C. Cultures of several of the lower fungi and bacteria were also made and tested for proteolytic activity. Proteolytic action was demonstrated for the species of fungi and bacteria examined.

The germicidal action of metals, A. C. Rankin (*Proc. Roy. Soc.* [*London*], *Ser. B, 82* (*1910*), *No. B 553, pp. 78–87, fig. 1*).—The results of experiments with plates of pure zinc, aluminum, and copper immersed in water are given. The purpose was to investigate the real cause of the germicidal effects of these metals, whether it is due, as heretofore claimed, to the formation of hydrogen peroxid and its subsequent action on the bacteria or to some other factor not yet discovered. In all the experiments the plates of metal were allowed to act for one hour on Montreal tap water to which *Bacillus coli* had been added, and the results tested by counting the number of colonies obtained by inoculating sterilized agar plates with a drop of this water and then incubating the plates for 24 hours at a temperature of 37° C.

Hydrogen peroxid was formed in the presence of zinc and aluminum, but not in the presence of copper. The germicidal action took place only while the metal plates were in the water; if the plates were removed and the water in which they had been immersed was allowed to stand for 12 hours and then tested, it showed no appreciable effect on bacteria, except slightly in the case of copper. The amount of hydrogen peroxid developed in 1 hour with zinc and aluminum was so small that it produced no perceptible effect on the colon bacilli. The germicidal action occurred with copper as well as with the other two metals, although it formed no hydrogen peroxid in the water. The metal plates produced no germicidal action when immersed in oxygen-free water.

The author concludes that the germicidal power of these metals is not due to the hydrogen peroxid formed or to the minute quantity of the metal that may be dissolved in the water, but is caused by the metals dissociating the oxygen molecule. The free ions thus liberated oxidize the bacteria and thus destroy them.

The effect of mineral salts on the respiration of germinating seeds, W. Zaleski and A. Reinhard (*Biochem. Ztschr., 23* (*1909*), *No. 3–4, pp. 193–214, dgms. 16*).—Experiments were made with lupine, maize, and pea seedlings in solutions containing various chemicals and the effect of the single salts and their combinations upon the respiration of the plants was determined.

Of the salts potassium nitrate, potassium phosphate, sodium nitrate, sodium phosphate, and magnesium sulphate when iso-osmotic with 0.1 per cent solution of potassium nitrate increased the energy of respiration beyond the maximum observed by Krzemieniewski (E. S. R., 14, p. 943), who claimed that only potash and nitric salts were able to stimulate respiration to any appreciable extent. The nutrient effect of the salts was not found to be equal to that described by many others. Zinc sulphate stimulated respiration, but it

can not be considered a plant nutrient. The nutrient effect of the various salts was inappreciable when used in a less strength than 0.02 per cent. The stimulating effect of the salts was found to be of very short duration, after which the respiratory energy fell.

The significance of the liberation of water vapor by plants, LECLERC DU SABLON (*Rev. Gén. Bot., 21 (1909), No. 248, pp. 295–311*).—Some doubt having been raised as to the importance of transpiration in the nutrition of plants, the author reviews some earlier literature and presents additional data which he believes indicate that the liberation of water vapor by plants has a far less important rôle than that usually given it by plant physiologists.

In concluding his discussion the author claims that the absorption of mineral salts by roots is independent of the absorption of water, and, as a consequence, of transpiration, and is regulated by the osmotic power of each of the salts occurring in the interior and the exterior of the plant. The utilization of these salts by the plant, which causes them to go into insoluble combinations, is the essential cause of their absorption through the roots.

An experiment by Schloesing with tobacco showed that when there was a considerable reduction of transpiration there was hardly any difference in the absorption of salts and there was a tendency to an increase in the dry weight of the plant. Transpiration is not necessary for the transportation of salts from the roots to the leaves, nor is there any relation between the transpiration and the formation of dry matter in plants.

The stomata are organs for the exchange of gas in the respiration and assimilation, and their physiological rôle and anatomical structure indicate that they are not for the escape of vapor, and that their function is to retain rather than to liberate water vapor from the plant.

The occurrence of hydrocyanic acid in some mushrooms, M. GRESHOFF (*Pharm. Weekbl., 46 (1909), No. 51, pp. 1418–1425, fig. 1*).—Attention is called to the occurrence of hydrocyanic acid in various mushrooms, and a number of species are mentioned as giving the reaction to that substance.

The mistletoe pest in the Southwest, W. L. BRAY (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 166, pp. 39, pls. 2, figs. 7*).—This paper presents the results of several years of investigation of the various phases of mistletoe parasitism, together with its history, development, germination, dissemination, and hosts.

In combatting this parasite, it is believed that if the mistletoe is on small branches pruning will suffice, but that when the branches are large and the infected area is considerable the mistletoe should be cut out and the wounds treated with an antiseptic paint or wash. Carbolineum proved especially effective for this purpose.

Seeds and plants imported during the period from April 1 to June 30, 1909. Inventory No. 19 (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 168, pp. 45*).—This is a list with notes on the economic value of the seeds and plants secured between April 1 and June 30, 1909, the number of introductions being 526. The list is made up of collections of seeds forwarded from correspondents and cooperators throughout various parts of the world.

FIELD CROPS.

Experiment on the fertilizer requirements of meadows, P. WAGNER (*Arb. Deut. Landw. Gesell., 1909, No. 162, pp. 106; abs. in Mark Lane Express, 103 (1910), No. 4089, p. 139; Deut. Landw. Presse, 37 (1910), Nos. 29, p. 321; 30, pp. 331, 332*).—The author outlines in detail 16 different series of experiments conducted at different points for from 4 to 9 years, reporting the

experiments conducted at different points for from 4 to 9 years, reporting the fertilizers applied during each year, and chemical and mechanical analyses of the soils, and discussing the results very fully, especially as to the amounts of nitrogen, phosphoric acid and potash required in fertilizing meadow soils and the forms in which phosphoric acid should be applied.

Soil analyses are regarded as of little value in determining the fertility requirements of meadows, but analyses of the crop produced by the soil are deemed useful as indicating its fertilizer requirements. It is thought that a meadow yielding hay containing 2 per cent or more of potash will not have its hay yield increased by the application of potash as the crop is already overfed. If the hay contains 1.8 per cent of potash, it is possible that applications of this fertilizer will increase the yield, if the percentage is 1.6 applications will probably prove beneficial, while if the potash content is but 1.4 per cent or less it is practically certain that the soil is deficient in potash. In some instances the author succeeded in raising the potash content of the hay produced by a given soil from 0.8 per cent to 3 per cent.

The same method is regarded as applicable in determining the phosphoric acid requirements of the soil. The percentages of this substance contained in the hay varied from 0.28 to 0.8. It is thought that the soil should be enriched with phosphoric acid when the hay contains less than 0.7 per cent. Basic slag is regarded as a better source of phosphorus than superphosphate because of the lime which it contains, as meadows are frequently sour and applications of kainit or muriate of potash may be made.

Pastures and meadows in the Weichsel marshes, C. A. Weber (*Arb. Deut. Landw. Gesell., 1909, No. 165, pp. 7–142*).—Meteorological data are given, together with many mechanical and chemical analyses of soils of the different localities on the Weichsel marshes, these being compared with similar data from the North Sea marshes. Systematic studies of the areas producing profitable grasses are reported from 17 different localities in each of which the various varieties found upon selected plats of 25 square meters are noted, together with the percentage of the plats occupied by each. Observations are also given on the relation existing between the character of vegetation present, the soil moisture and texture, and the amount of plant food present.

Promising root crops for the South (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 164, pp. 43, pls. 10*).—This consists of two papers.

I. *Yautias, taros, and dasheens*, O. W. Barrett (pp. 7–29).—This paper reports a continuation of investigations begun in Porto Rico, and reported as Bulletin 6 of the Porto Rico Station (E. S. R., 17, p. 246). A general description is given of yautias, taros, and dasheens, together with directions for their culture, fertilization, harvesting and storage, and suggestions as to their probable value in this country. It is stated that these plants are moderate in their cultural and fertility requirements and have comparatively few insect and fungus pests. They are propagated by cuttings of the root or root stock and different varieties may be used as salad plants, as stock food, either fresh or ground into meal, or for the production of alcohol. Tubers of many varieties are suitable for table use.

The author believes that they may be profitably grown on large areas of abandoned wet lands. Although introduced from the tropics their crop season is sufficiently short to allow their maturing before killing frosts during most years, and one or two varieties have produced a fair yield as far north as central New York. The Rolliza yautia has produced 15 tons of edible tubers per acre, besides 5 tons of rootstocks suitable for stock feeding or starch manufacture.

II. *Agricultural history and utility of the cultivated aroids*, O. F. Cook (pp. 31–37).—A sketch is given of the historical and agricultural importance of aroids, including a discussion of their distribution and of their interest from the standpoint of ethnology. The extent of their present food use in the different parts of the world and the possibilities for their introduction for that purpose among Europeans are discussed.

Variegated alfalfa, J. M. WESTGATE (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 169, pp. 63, pls. 9, figs. 5*).—Studies of fields of especially hardy alfalfa have indicated that the hardy strains agree quite closely in botanical and agronomic characters. These characters indicate that the hardiness of these strains arises from their possession of a small percentage of the blood of *Medicago falcata*, which occurs wild in Siberia on the dry cold steppes of Siberia, far north of the range of ordinary alfalfa (*M. sativa*). The term variegated alfalfa is used in this bulletin to designate the progeny of the intermediate hybrid formation, secured by crossing different strains and varieties of alfalfa.

For sections presenting winter conditions too severe for ordinary alfalfa, it is suggested that the preference may well be given to the Grimm alfalfa, sand lucern, and Canadian alfalfa, and that the initial seeding of any of the variegated alfalfas should be on a small scale in sections new to them, because the preliminary field tests are of too short a duration to warrant definite conclusions as to their relative value. The great variation among individuals of the different strains of variegated alfalfa gives great promise of the result that may be obtained from breeding and selection for the further development of improved strains.

A discussion of the history and commercial value of the sand lucern is followed by a similar study of the Grimm alfalfa and a briefer discussion of Canadian alfalfa, German alfalfa and Russian forms of variegated alfalfa from Simbirsk and Kharkof, an outline of the work resulting in the recreation of variegated alfalfa, and comparative botanical studies of the different strains and their parents.

The influence of storage and drying on barley, W. WINDISCH and E. BISCHKOPFF (*Wchnschr. Brau., 26 (1909), Nos. 38, pp. 449–459; 39, pp. 469–479; 40, pp. 524–530; 41, pp. 534–542*).—This article reports experiments on the effect of storage and drying on 77 samples of barleys grown in the different German provinces in 1902 and 1903, both ordinary barleys received from the farms and special samples prepared for exhibition purposes being used in the tests. Determinations were made of the vitality, viability, total nitrogen and albumin, water soluble nitrogen, coagulable albumin, proteolytic action, specific weight of extracts obtained, total phosphoric acid, diastatic power, amount of dextrin, sugar, and other carbohydrates present, and other data of interest.

The barleys of 1902 had a water content of about 13.9 per cent which was reduced by drying in storage to 9.5 per cent. In 1903, the water content was 14 to 15 per cent in the case of the barleys prepared for exhibition purposes and 15 to 16 per cent for the barleys received from the fields. The barleys stored in sacks and dried gradually contained 11 to 12 per cent of water. The exhibition barleys, when dried for 2 days at from 20° to 25° C., had the water content reduced to 9 per cent, and those from the fields fell to from 7 to 11 per cent.

The vitality and viability of all barleys grown in 1902 was increased through drying to the extent of from $\frac{1}{4}$ to $\frac{1}{3}$ the original vigor. Slow drying in air had a more favorable effect than rapid drying at a higher temperature. Results of tests of proteolytic action during the two years were quite different.

Storing and drying had apparently a marked influence on solubility. In 1902, the water soluble nitrogenous material decreased in 77 per cent of the

dried barleys, and increased in the remainder, whereas in 1903, an increase took place in half the samples. Variations in weather, soil, and other local conditions are assigned as the causes. Differences in coagulable nitrogen were so small as to be within the limits of experimental error (0.01 to 0.02 per cent). The soluble phosphoric acid of 62 per cent of all samples showed an increase, and in general this increase appeared to be accompanied by a decrease of soluble nitrogenous material. Steeping to complete the malting process appeared to increase the soluble nitrogenous material. In 1903, drying appeared to increase the diastatic power in $\frac{2}{3}$ of all samples, decreasing it in the remainder, while the proteolytic power decreased in $\frac{2}{3}$ of the cases and increased in the remainder. The carbohydrate content appeared to have decreased during drying in the case of half the samples, while an increase appeared in the other 50 per cent.

Corn culture, J. M. Kimbrough (*Georgia Sta. Bul. 88, pp. 44–63, figs. 15*).—Variety, fertilizer, and cultural tests are reported.

In a test of 23 varieties, 3 strains of Marlboro Prolific produced more than 40 bu. each per acre with from 116 to 136 ears to the bushel of shelled corn. An experiment to determine the relative productivity of seed corn from long and short ears showed average yields of 45.47 and 43.22 bu. per acre, respectively, reversing the small difference in favor of the short ears previously reported (E. S. R., 21, p. 538).

In a fertilizer experiment comparing cotton-seed meal, tankage, and a mixture of the two as sources of nitrogen, the respective yields per acre were 43.49, 45.62, and 44.42 bu. In another series of tests, formulas made up of 150 lbs. acid phosphate, 7.28 lbs. muriate of potash and 180 lbs. of cotton-seed meal, or an amount of nitrate of soda or sulphate of ammonia sufficient to supply an equivalent quantity of nitrogen, was used. Analyses showed the cost of a pound of nitrogen at prevailing prices to be 23.5 cts. in cotton-seed meal, $18\frac{1}{3}$ cts. in nitrate of soda, and 13 cts. in sulphate of ammonia. The cost of the increased yield was $1, 86 cts., and 74 cts. per bushel, respectively.

The Gilmore method of corn culture has proved uniformly good at this station and is recommended, while the trials of the Williamson method were unfavorable, except in a test of a modified form. In a comparison with ordinary corn culture, the ordinary method yielded 26.19, the Gilmore method 30.39, and the Williamson method 24.23 bu. per acre. The cost of production by the Gilmore method was $5\frac{2}{3}$ cts. per bushel less than by the Williamson method and about 20 cts. less than by the ordinary method. These differences in cost arose from wide differences in the cost of cultivation and of the fertilizers applied.

A difference in yield of 11.23 bu. per acre in favor of planting 2 kernels per hill instead of 1 was secured when the hills were $3\frac{1}{2}$ ft. apart each way. Plats on which was used a complete fertlizer supplying 150 lbs. acid phosphate, 180 lbs. cotton-seed meal and 8.4 lbs. of muriate of potash per acre at a cost of $4.23 produced 1.89 bu. more corn per acre than did plats treated with a mixture of 300 lbs. of acid phosphate, 60 lbs. of muriate of potash and 60 lbs. of nitrate of soda costing $5.61 per acre.

Agricultural value of nitrogenous materials for cotton on the Houston clays, as determined by field trials, F. D. Stevens (*Alabama Canebrake Sta. Bul. 27, pp. 16, fig. 1*).—In an 8-year trial with cotton on the red, gray and black phases of the Houston clay an average net profit of $1.86 per acre resulted from the annual application of 200 lbs. of cotton-seed meal. The agricultural or crop-producing value of the nitrogen in cotton-seed meal and nitrate of soda is estimated at 36.9 cts. and 73.9 cts. per pound respectively, on these soils, assuming that the fertilizers are purchased for their nitrogen content alone.

One acre produced without fertilizer in 1903, 320 lbs. of seed cotton, a total of 18.6 tons of alfalfa hay during the next 3 years, an unrecorded yield of cotton in 1907 and 1,942 and 1,542 lbs. of seed cotton in 1908 and 1909, respectively. It is calculated that the residue from the 3 years' stand of alfalfa equaled in results the application of 111.4 lbs. of nitrate of soda or 508 lbs. of cotton-seed meal. In 1908, 6.3 acres of alfalfa averaged 3.9 tons of hay per acre, while in 1909, an average of 3.46 tons was secured from a meadow 7 or 8 years old.

Crushed raw lime rock applied at the rate of 6,400 lbs. per acre was followed by a decreased yield of cotton. With a mixture of 200 lbs. of cotton-seed meal and 200 lbs. of acid phosphate, costing $3.90 per acre there was an increased yield of cotton worth $2.88. Bur clover turned under in the spring was followed by an increased yield of cotton, valued at $14.58, a net gain of $4.86. Approximately the same results were secured with crimson clover.

Planting corn land in September to vetches or clovers and cutting for hay before planting the land to cotton the following spring, resulted, except with white clover, in a small cotton crop the first year, but the total crop for the 2 years exceeded that from land unfertilized, left bare through the winter and planted early in both years. Land sown to oats or to oats and vetch in the fall failed to give so favorable results. Redtop turned under caused a slight increase in the yield of cotton.

During 1908, tests of cotton-seed meal, acid phosphate, kainit and nitrate of soda in various combinations were made on a black phase of the Houston clay. Increased yields were secured from all combinations containing cotton-seed meal or nitrate of soda, except in the case of a plat fertilized with 200 lbs. of cotton-seed meal, 200 lbs. phosphate, and 100 lbs. kainit per acre. Results of similar experiments on these plats in 1909 are also reported.

On black bottom land, applications of (1) nitrate of soda, (2) 160 lbs. cotton-seed meal per acre, and (3) 160 lbs. cotton-seed meal and 160 lbs. kainit per acre were followed by net profits of $4.22, 66 cts., and 24 cts. per acre, respectively, as compared with the net profit obtained on untreated plats. Net losses varying from 69 cts. to $5.19 resulted where there were applications of acid phosphate and kainit, singly and in combination with cotton-seed meal. In another fertilizer test on black bottom land, an increased net profit of $5.84 was obtained from application of 80 lbs. of nitrate of soda per acre, $2.40 from application of 200 lbs. of cotton-seed meal per acre, $2.05 from 150 lbs. fish guano, and $1.48 from 100 lbs. of tankage. Losses resulted from application of (1) 200 lbs. cotton-seed meal and 200 lbs. acid phosphate, and (2) 125 lbs. of dried blood. Fish guano at $44.60 per ton did not take the place of cotton-seed meal at $30 per ton.

On poor red land, an increased net profit of $9.80 per acre resulted upon the application of 80 lbs. nitrate of soda, $3.60 from that of 240 lbs. cotton-seed meal and 200 lbs. acid phosphate, and $1.74 from 160 lbs. fish guano, while losses of 58 cts. and $2.74, respectively, resulted upon the application of 100 lbs. of dried blood, either on July 15 or at planting.

Tabulated data of the results from the application of commercial fertilizers to land planted continuously to cotton for 6 years and receiving no vegetable matter save the crop residue showed that the percentage of advantage secured by the application of fertilizers decreased from 145 in 1905 to 36 in 1909, during which year a profit of $1.52 was secured from an application of fertilizer worth $9.55 per acre.

In variety tests, Peterkin, Brown Five Lock, Truitt, and Drake each produced 868 lbs. or more of seed cotton per acre, while on upland soil, William Improved,

Russell Big Boll, and Mortgage Lifter produced more than 1,000 lbs. each. It is concluded that no one variety is suited to a single soil and that varieties must be selected which are adapted to the various phases of each soil type.

Varieties of American upland cotton, F. J. Tyler (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 163, pp. 127, pls. 8, figs. 67*).—The economic botany of cotton, the origin of upland varieties, stability of varieties and influence of soil and climate are discussed and the terms used in descriptions fully explained. A classification of varieties is then given and discussed, and the results of tests of 5 varieties, each grown in 4 different States, showing the relative number and size of bolls and seeds, percentage of lint to seed, and the length and strength of the lint are presented in tabular form. Among 10 varieties, an average of 58.4 5-locked bolls or 72.3 4-locked bolls yielded a pound. Three-locked bolls of the King variety ran 149 to the pound.

Descriptions of a large number of varieties comprise the greater part of the bulletin. A statement is made of the group to which each variety belongs, its geographical distribution, the publications in which it is mentioned or described, the number of bolls per pound, seeds per pound, the length of lint, strength of single fibers, and percentage of lint to seed. A description of the plant and a historical sketch of the variety are also given in many instances.

Cotton culture, J. M. Kimbrough (*Georgia Sta. Bul. 89, pp. 67–84, figs. 2*).—In a test of 34 varieties, Cleveland Big Boll, Triumph, and Moore Improved stood first in yield with 1,675.44 or more pounds of seed cotton per acre, while Triumph, Hope Mexican Early Big Boll, and Livsey Early Big Boll showed the greatest freedom from anthracnose, having 1 per cent or less of diseased bolls.

Tests of various complete fertilizers carrying equivalent quantities of phosphoric acid, potash and nitrogen were made to determine the most advantageous sources of nitrogen and potash. In each case the standard for comparison was the station formula, containing 444 lbs. acid phosphate, 33 lbs. muriate of potash and 223 lbs. cotton-seed meal, and costing $7.83 per acre. In one test, there was produced with this mixture a yield of 1,380.6 lbs. of seed cotton per acre, while with the substitution of nitrate of soda and sulphate of ammonia for the cotton-seed meal, making the cost $7.64 and $6.85, respectively, there was produced 1,427.71 and 1,502.11 lbs. of seed cotton per acre, respectively. The unfertilized plat in this series produced 889.2 lbs. of seed cotton per acre.

When 132 lbs. of kainit were substituted for the muriate of potash, the cost per acre was increased 9 cts. The yields of seed cotton were 1,420.89 lbs. and 1,293.84 lbs. per acre, respectively, while the unfertilized plat yielded 663.92 lbs. per acre. As a preventive of rust, kainit was almost a failure.

Substituting tankage for all and for half of the cotton-seed meal resulted in average yields of 1,357.51 lbs. of seed cotton per acre with the tankage formula, 1,496.24 lbs. with the tankage-cotton-seed meal formula, and 1,438.63 lbs. with the standard formula.

As compared with high grade guano, costing $7.23 per acre, the station formula produced 33 lbs. more of seed cotton per acre the first year and 6.4 lbs. less the second year. When the fertilizer was applied and bedded on before planting, 56.27 lbs. more seed cotton per acre was produced than when two-fifths was drilled in the opening furrows and bedded on, two-fifths applied June 9 and the remaining one-fifth applied June 30. This was in general accord with results during the preceding season (E. S. R., 21, p. 538).

Screened seed produced 92.73 lbs. more seed cotton per acre than did unscreened seed. A brief discussion is also given on cotton wilt (*Neocosmospora vasinfecta*).

Notes on cotton cultivation in Nyasaland, J. S. J. McCall (*Nyasaland Agr. and Forestry Dept. [Pub.], 1909, No. 4, pp. 4*).—The area devoted to cot-

ton growing in Nyasaland decreased from 22,000 acres in 1905 to 7,000 in 1907, as it has been found that the growing season is too short for maturing the Egyptian varieties at the elevation of 2,500 ft. The average lint percentage of upland cotton is now 27 per cent. Means of improving this and other features of the cottons grown are discussed, together with their cultivation, climatic requirements, and the time and methods of planting, topping and harvesting, in both uplands and lowlands. Notes are given on insect pests.

Cotton facts, A. B. SHEPPERSON (*New York, 1909, pp. IX+186, fig. 1, map 1*).—A review of the cotton season of 1908–9 and of the prospects for the season of 1909–10 is followed by crop and other statistics for the United States and other countries. Meteorological data and information of general interest to cotton growers are included.

Cotton, the greatest of cash crops, S. A. KNAPP (*U. S. Dept. Agr., Office Sec. Circ. 32, pp. 10*).—In this address, delivered at Greenville, Miss., January 17, 1910, the past and present world demand for cotton is outlined and the position of the United States in supplying the demand is discussed. The present status of cotton growing in the United States is set forth with special reference to boll weevil conditions.

Broom millet, G. MARKS (*Dept. Agr. N. S. Wales, Farmers' Bul. 20, pp. 20, figs. 11*).—Discussions of the trade and fertility requirements and of the marketing and botany of broom millet are followed by directions for producing, harvesting and baling the crop, and for seed selection.

Oats, E. G. MONTGOMERY (*Nebraska Sta. Bul. 113, pp. 3–16, fig. 1*).—Tabulated data present the results of a test of 12 varieties of oats and indicate the yield per acre, susceptibility to rust, date of heading, and date of harvesting of each of the varieties.

The earlier varieties have given, during the past 5 or 6 years, an average yield 14 bu. per acre greater than that of the later varieties.

Sowing at the rate af 8 pk. per acre gave the best results with drilled Kherson oats and 10 pk. when the oats were sown broadcast. Cultivation gave an increased yield of 4.8 bu. per acre of drilled oats but a decreased yield of broadcast oats. When the rainfall is more than normal, damage is done by cultivating either oats or wheat but when precipitation before seeding has been meager, cultivation of grain produces good results by conserving moisture and removing a part of the stand.

Owing to the difference in weight and volume of kernel, 8 pk. of Kherson, 14 pk. of Dun, and 19 pk. of New Reliance oats produced the same number of plants per acre. It is noted that there was a strong tendency for thin seedings to tiller enough to bring the stand up to normal, or about 1,700,000 stems per acre.

Improvements in paddy cultivation on the home farm at Sivagiri, Tinnevelly district, J. M. LONSDALE (*Dept. Agr. Madras Bul. 61, pp. 8*).—The operations of the station are outlined and the value of the various crops of the region discussed.

A number of varieties of paddy have been introduced from northern India and elsewhere. Swarnavari and Banku, which are brought from regions where the atmosphere is exceedingly hot and dry and irrigation water is never abundant, are particularly good in quality, yield, early maturity and drought resistance, but lose these characteristics when grown under less exacting circumstances, so that it is necessary to obtain new seed every 5 or 6 years. Seed selection is being carried on for the improvement of the introduced varieties, and a brief statement of the more important points with regard to 9 of these varieties is given.

Biological studies of green and brown kernels of summer rye, E. Gross (*Ztschr. Landw. Versuchsw. Osterr., 12 (1909), No. 2, pp. 74–76*).—In 1908, an experiment was undertaken with the green and brown kernels of summer rye. The color was transmitted with considerable certainty. The plants produced by the brown kernels showed shorter straw, longer, looser ears, smaller kernels, and a greater weight per plant but a lower total weight of grain per plant and a lower weight per kernel than did the plants from green kernels.

Sisal hemp, T. H. Wells (*Dept. Agr. N. S. Wales, Farmers' Bul. 25, pp. 17, figs. 3*).—The climatic, soil, and cultural requirements of sisal hemp are outlined and harvesting and milling discussed.

Select list of references on sugar chiefly in its economic aspects, H. H. B. Meyer (*Washington: Library of Congress, 1910, pp. 238*).—This exhaustive compilation of bibliographical data has reference more especially to the material in the Library of Congress and does not include the publications of the state experiment stations.

The titles are arranged under the three main headings: General and economic, agriculture, and chemistry and manufacture. Separate sections have been given to some of the more important government publications of Great Britain and the United States, while the articles in consular reports and periodicals have been arranged chronologically.

Report on tobaccos from Nyasaland, W. R. Dunstan (*Nyasaland Agr. and Forestry Dept. [Pub.], 1909, No. 3, pp. 4*).—This report on 5 samples of tobacco received from the Agricultural, Forestry and Botanical Department of Nyasaland includes analyses of 3 of the samples.

The percentage of nicotine is in all 3 cases lower than the average found in American tobaccos of similar type. The characteristics of aroma and flavor produced when they are burned are also different and will probably prove a difficulty in the way of their finding an extended market in Europe. An examination of the ash with reference to the effect of its constituents on the burning quality of tobacco show no reasons for reversing the general belief that potash is advantageous, lime deleterious only when in excess, magnesia slightly deleterious, and sulphuric acid and chlorin markedly deleterious.

A text-book on tobacco, C. Werner (*New York, 1909, pp. 136, pls. 7*).—A historical sketch is followed by a classification of the leaf and products of tobacco, a statement of the methods of cultivation, curing and manufacture, a chapter on the manufacture of pipes, information on taxation and packages, and a discussion of the tobacco bug and its remedy. Statistics and general information adapted to the needs of the retailer are also given.

The present status of the tobacco industry, W. W. Garner (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 48, pp. 13*).—This circular contains a statement of facts bearing upon the advisability of undertaking tobacco culture in various localities, especially in new territory in the United States.

A brief history of the development of a specialized tobacco industry is followed by a statement of the different classes of tobacco, arising from variations in soil, climatic conditions and methods of production. These types, based on present market requirement, are the cigar, export, and manufacturing types, the first including filler leaf, wrapper, binder leaf, and shade-grown tobacco; the second, dark fire-cured tobacco, Maryland and eastern Ohio, and air-cured tobacco; and the third chiefly Burley tobacco, dark manufacturing tobacco, bright flue-colored tobacco, and perique. The more salient facts with regard to each are presented.

[Protein and water content of seven varieties of wheat], T. E. Keitt (*South Carolina Sta. Rpt. 1909, pp. 23, 24*).—The protein content of the varie-

ties analyzed ranged from 12.38 to 15.29 per cent, the water content from 12.26 to 12.84 per cent.

The adulteration and misbranding of the seeds of alfalfa, red clover, orchard grass, and Kentucky blue grass, A. F. WOODS (*U. S. Dept. Agr., Office Sec. Circ. 31, pp. 4*).—None of the 359 samples of alfalfa secured was adulterated or misbranded but 107 contained dodder. Of the 630 samples of red clover seed, 54 contained dodder, the percentage being only one-fifth of that of a year ago, when low-grade seed was being more extensively imported from European sources. Of the 379 samples of orchard grass seed obtained, 55 were adulterated with seed of meadow fescue or rye grass or both. Of 446 samples of seed obtained as Kentucky blue grass, only 14 were wholly or in part Canadian blue grass seed, while germination tests gave results varying from zero to 90 per cent with an average of 62 per cent.

Of the total of 1,814 samples secured, 69 were found to be adulterated or misbranded and the results of their analyses, together with the names of seedsmen by whom they were offered for sale, are included in this circular.

Seed inspections (*Maine Sta. Off. Insp. 17, pp. 165–180*).—The chief requirements of the state seed inspection law are explained, various features connected with its enforcement discussed, and directions given for taking and mailing samples of seed for free analysis, and for testing seeds at home. A list is given of the 79 kinds of weed seeds found in seeds examined in 1909, together with tables showing the frequency of their occurrence, and the results of analyses of the official samples collected in 1909.

The grass and clover seed trade in Vermont in 1907–1909, G. T. HARRINGTON (*Vermont Sta. Bul. 146, pp. 205–240*).—Tabulated results of the analyses of 131 samples of seed examined since 1907 show that timothy was usually of good grade, alsike variable, and red clover extremely variable.

The danger of importing the seeds excluded by state laws from the markets of other States and countries is noted. Other topics discussed are the qualities of good commercial seed, weed seed, seed control with special reference to Vermont conditions, the dangers of low grade seeds, miscellaneous seeds tested, and Vermont's worst weeds in 1909 as compared with those in 1872, 1891, and 1898. Weeds noted as recently having become frequent enough to be troublesome are rib grass or lance-leafed plantain; clover dodder (*Cuscuta epithymum*), first reported in Vermont in 1900; blue weed (*Echinum vulgare*); prickly lettuce (*Lactuca scariola*); hoary alyssum (*Berteroa incana*) 1895; tumble mustard (*Sisymbrium altissimum*) 1900; squirrel tail grass (*Hordeum jubatum*); wormseed mustard (*Erysinum cheiranthoides*); and (*Petstemoin lævigatus*).

Cascuta europæa and its hosts, V. B. WITTROCK (*Svensk Bot. Tidskr., 3 (1909), No. 1, pp. 1–17, figs. 2*).—A brief discussion of this parasite is given, followed by a host index of over 100 plants arranged according to families.

The common toad flax, C. KRAUS (*Arb. Deut. Landw. Gesell., 1909, No. 166, pp. 5–23, pl. 1, figs. 18*).—A discussion of the weed varieties of the genus Linaria is followed by a statement of the habitat and geographical distribution of the common toad flax, a description of the plant, a statement of its habits, and a discussion of methods of eradication.

HORTICULTURE.

New methods of plant breeding, G. W. OLIVER (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 167, pp. 39, pls. 15, figs. 2*).—This bulletin deals with methods used by the author in accomplishing what have hitherto been considered impossible or difficult crosses. The prominent feature of these methods consists of "de-

pollination" or the removal of pollen from the stigma before fecundation has taken place. This process has been successfully used on several genera of the Compositæ and can be used with all flowers having reproductive organs too small to be successfully manipulated by the ordinary methods of emasculation. It may also be applied to the stigmas of larger flowers to remove pollen which may have gained access to the stigmas previous to an artificial pollination.

The author discusses the development of depollination in his plant breeding work, the necessary tools and equipment for depollination and emasculation, the possible origin of hybrids and crosses of composite flowers, and preparation of seed and pollen bearing plants. In giving an account of his work with alfalfa, two methods of depollinating the flowers, by means of a tiny jet of water and by compressed air, are described in detail. Consideration is also given to the growing of breeding plants, raising seed from crosses, crossing large flowered legumes, crossing in large and small numbers, hybridizing species, crossing cultivated varieties on natural species, cross-pollinating clovers, and methods of emasculating and pollinating common flowers. References are made to many difficult crosses which the author has performed and the methods used are fully illustrated.

Recent investigations on the occurrence of parthenogenesis among orchard trees and other fruit-bearing plants, EWERT (*Landw. Jahrb., 38 (1909), No. 5-6, pp. 767-839, figs. 7*).—In continuation of the author's previous investigations on flower biology (E. S. R., 17, p. 1156) and the occurrence of parthenogenesis among fruit trees (E. S. R., 19, p. 142), an account is given of observations and studies made during the years 1907-8 with apples, pears, quinces, cherries, peaches, gooseberries, currants, grapes, strawberries, cucumbers, tomatoes, and hazlenuts, including investigations of single variety orchard plantings and of the influence of seeds upon the development of fruit and upon the nutrition processes in the plant. The methods employed and results secured by other investigators along this line are compared with those of the author. The report concludes with discussions relative to the occurrence and probable value of flowerless apples and the nature of parthenogenesis.

The author is led to conclude from his own investigations, as well as from the results secured by others, that many so-called cases of self-fertilization, particularly among apples and pears, are in reality due to parthenogenesis and that in varieties where this occurs cross-pollination is unnecessary. The occurrence of parthenogenetic fruit appears to be a varietal characteristic, the general factors of growth being of only secondary importance in producing such fruit. The opinion is advanced that not only must considerable more data be accumulated but more satisfactory methods of investigations must be worked out in order to make our knowledge of this subject of value in practical fruit culture.

The resistance of plants to frost (*Gard. Chron., 3. ser., 47 (1910), No. 1208, pp. 120, 121*).—A review of our present knowledge relative to the means by which the more resistant species of plants protect themselves from injury by frost.

Report of horticulturist, C. C. NEWMAN (*South Carolina Sta. Rpt. 1907, pp. 16-22*).—A progress report of cultural experiments with fruits, nuts, and vegetables, including a table showing that the nuts from some 61 seedling pecans varied in size, from 51 to 192 making a pound.

Report of horticulturist, C. C. NEWMAN (*South Carolina Sta. Rpt. 1908, pp. 19-22*).—A progress report on cultural and breeding experiments with fruits, nuts, and vegetables. Experiments are being conducted in grafting apples to determine the length of stock and scion suitable for producing the largest

number of first grade trees, and results of this work to date are presented in tabular form.

Cultural methods for some common vegetables, R. S. Herrick, W. Paddock, and L. F. Paull (*Colorado Sta. Circ. 5, pp. 11*).—Brief popular directions are given for growing asparagus, cabbage, celery, onions, and tomatoes.

Garden accessories and mushroom growing, R. R. Jeffries, W. Paddock, and L. F. Paull (*Colorado Sta. Circ. 6, pp. 10*).—This circular contains brief popular directions for the preparation and use of cold frames and hotbeds, sterilizing the seed bed for tomatoes and other plants, and mushroom growing.

Fall and winter cabbages, C. C. Newman (*South Carolina Sta. Rpt. 1909, pp. 118–124, figs. 2*).—Brief popular directions are given for growing fall and winter cabbages in South Carolina. The phases discussed include preparation of soil, the plant bed, transplanting to the field, fertilizers, cultivation, and varieties.

A strain test of Jersey Wakefield cabbage, C. E. Myers (*Pennsylvania Sta. Bul. 96, pp. 3–18, figs. 5*).—This is a progress report covering two years of a test of 25 strains of Jersey Wakefield cabbage secured from various seed dealers. Notes are given for both seasons on the strain secured from each dealer, and the data are also presented in tabular form.

A number of marked variations have occurred within the variety, with great differences in earliness, yields, and form and solidity of heads. The degree of vigor of the young plants has thus far proved of no value in indicating the size or character of the resultant crops. The percentage of germination of some strains was very low. The work is to be continued for several years to determine the full importance and significance of the variations noted.

The cost of fruit growing, A. Janson (*Fühling's Landw. Ztg., 59 (1910), No. 3, pp. 99–110*).—A discussion of factors which go to make up the cost of establishing and maintaining fruit orchards, together with suggestions relative to methods of estimating their productive value.

Orchard management, O. B. Whipple and W. Paddock (*Colorado Sta. Circ. 3, pp. 7*).—This circular contains brief popular suggestions relative to orchard irrigation and cultivation, shade crops, and preparing orchards for winter.

Preparing land and trees for orchard planting, W. Paddock and O. B. Whipple (*Colorado Sta. Circ. 4, pp. 7*).—Brief popular suggestions are given.

Pomological possibilities of Texas, G. Onderdonk (*Texas Dept. Agr. Bul. 9, pp. 55, figs. 9*).—This bulletin discusses the possibilities for the commercial culture of a large number of orchard and small fruits and nuts in Texas. Separate chapters are devoted to the orange, fig, peach, pear, grape, plum, apple, persimmon, mulberry, apricot, pecan, and date. Consideration is also given to berries and a number of miscellaneous fruits.

Fruits adapted to Wyoming (*Wyo. Bd. Hort. Spec. Bul., 1 (1910), No. 2, pp. 6–10*).—A list based on data secured in different sections of the State is given of some of the best varieties of apples, pears, plums, cherries, raspberries, currants, gooseberries, and strawberries, adapted for culture in Wyoming.

The transportation of fruits and other edible products in refrigerator cars, Bizot (*Ann. Soc. Agr. Sci. et Indus. Lyon, 1908, pp. 53–73*).—An account of the development and present status of the refrigerator car service in France, with notes on the transportation of specific products, including fruits, meats, butter, milk, beer, and ice.

Drying apricots and peaches, W. J. Allen (*Dept. Agr. N. S. Wales, Farmers' Bul. 14, pp. 9, figs. 7*).—A popular bulletin discussing methods and equipment used in drying apricots and peaches.

Pineapple culture. VI, The effect of fertilizers upon the quality of the fruit, A. W. Blair and R. N. Wilson (*Florida Sta. Bul. 101, pp. 29–42, fig. 1*).—

In previous work with pineapples (E. S. R., 17, p. 1154), it was shown that an increase of fertilizers up to a certain point resulted in a decided increase of larger sized fruit but in no material increase in the total number of fruits, and that certain fertilizers are unsuitable for the pineapple plant. The experiments were continued as previously outlined to determine whether the quality of the fruit is affected by the kind or quantity used. The plan of the work and methods of sampling and analysis, together with the data and results secured for the years 1905 to 1908, are here reported.

In general, it was found that the eating quality of pineapples, so far as their sugar and acid content is concerned, does not appear to be affected by the kind of fertilizer used, although their shipping quality may be thus affected. Increasing the fertilizer slightly increases the sugar content and very slightly decreases the acid content of the pineapples, although the work does not indicate to which fertilizing constituent the increase in sugar is due. Large fruits contained a greater percentage of sugar than small ones and slightly less acid. The ratio of reducing sugars to sucrose was greater in the large fruits. An increase of fertilizer failed to increase the nitrogen percentage of the fruit.

From the analyses reported, the following averages were made up, the weight of fruit in all cases being reckoned without the crown: Weight of one fruit, 65 determinations, 966.2 gms.; edible portion, 33 determinations, 61 per cent of the fruit; available juice, 85 determinations, 92.84 per cent of the edible portion; total solids in whole fruit, 66 determinations, 15.18 per cent of the fruit; nitrogen, 63 determinations, 0.064 per cent of edible portion; and acids calculated as citric, reducing sugars, sucrose, and total sugars, 100 determinations each, 0.98, 2.60, 9.47, and 12.07 per cent of the juice, respectively.

Pineapple by-products, T. F. Sedgwick (*Hawaii. Almanac and Ann., 36 (1910), pp. 106–110*).—A brief description of the process of canning pineapples with a view to pointing out the nature of the refuse from a pineapple factory and the possibility of its utilization. It is estimated that 1 ton of pineapple waste will produce 1,700 lbs. of juice and 100 lbs. of dried pulp. This amount of juice will yield 17 lbs. of citrate of lime, valued at $2.38, and 20 gal. of molasses, valued at $10.

Notes on the season of maturity of table grapes in Italy (*Bol. Min. Agr., Indus. e Com. [Rome], 8 (1909), Ser. C, No. 10, pp. 19–29*).—Lists are given showing the period of maturity of a large number of varieties of table grapes grown at various government nurseries in Italy.

Investigations on the maturing of grape wood and the training of American stocks, F. Schmitthenner (*Landw. Jahrb., 38 (1909), No. 4, pp. 629–691, figs. 5*).—The author reviews the scientific and practical knowledge relative to the anatomical and chemical changes which take place during the maturing of grapevines, and in conclusion summarizes those factors which are of importance for the production of well matured grafting stocks, with special reference to the American vines which are used in reestablishing the German vineyards. The subject matter is discussed under the general headings of the indications of maturity and the process of ripening, and the influence of climatic and soil conditions, vine diseases and methods of combating them, methods of training the vines, and leaf activities upon the ripening of wood. The principal points brought out in the study are summarized.

The author concludes that the general climatic conditions in German viticultural districts are not the most favorable for securing well ripened wood of American grapes. This difficutly must be obviated by training the vines in a manner suitable for procuring the proper relation between the light, air, and moisture. The trellis system of training appears to be the best,

The graft stocks in 1909, J. M. GUILLON (*Rev. Vit., 33 (1910), No. 843, pp. 141–148, figs. 6*).—A progress report on the behavior of a number of American grapes being used to reconstitute the vineyards of Charente, relative to their resistance to drought, soil adaptation, effect on yields, etc. (E. S. R., 18, p. 941).

Shield budding the mango, J. E. HIGGINS (*Hawaii Sta. Bul. 20, pp. 6–16, pls. 2, figs. 4*).—The author has conducted tests of various methods of propagating desirable varieties of mangoes and finds that patch-budding, the method successfully employed by Oliver (E. S. R., 15, p. 365) and by Knight (E. S. R., 12, p. 559), although greatly superior to inarching, can be successfully employed only when both bud-wood and stock are in flush or active growth, a condition which frequently does not exist in both members at the same time.

The experiments here reported indicate that shield budding with the "T" incision inverted is adapted to the peculiarities of the mango and much more rapid in execution than the patch-bud method. It may be used successfully when the bud-wood is not in active growing condition. The method may be applied advantageously in working seedling trees in orchard form and in top working old trees to new varieties. It also appears highly probable that it would be applicable to nursery trees. This process of budding is illustrated and described in detail and a study of the bud union is reported.

One coffee plantation, D. W. MAY (*Porto Rico Hort. News, 3 (1910), No. 3, pp. 33, 34*).—With the view of illustrating what can be done in the way of developing old coffee plantations, the receipts and expenditures for the past 4 years are given of an old plantation which is undergoing renovation.

Pecan culture, G. L. CLOTHIER (*Mississippi Sta. Bul. 124, pp. 8*).—The purpose of this bulletin is to set forth the present status of pecan culture in Mississippi. It discusses choice of varieties, selection of location and site, purchasing nursery stock, returns from pecan orchards, planting the orchard, cultivation and care, pruning, and top working old trees.

Sago and sago palms, L. A. T. J. F. VAN OIJEN, J. FORTGENS, and J. TUPAMAHU (*Bul. Kolon. Mus. Haarlem, 1909, No. 44, pp. 120, pls. 9, figs. 2*).—This bulletin consists of a series of contributions to the knowledge of the botany, exploitation, and uses of the sago palms in the Dutch East Indies.

Vermont shrubs and woody vines, L. R. JONES and F. V. RAND (*Vermont Sta. Bul. 145, pp. 51–199, figs. 84*).—This bulletin consists of a key with complete descriptions, economic notes, and illustrations for determining the shrubs and woody vines of Vermont.

The trees and shrubs of San Antonio and vicinity, B. MACKENSEN (*San Antonio, Tex., 1909, pp. 51, figs. 15*).—A popular handbook of woody plants growing naturally in and about San Antonio, Tex., including some introduced species. It contains a general description of the San Antonio region and plant formations, together with an enumeration and description of species.

The best trees for lawn, street, and woodland planting, J. J. LEVISON (*Gard. Mag. [N. Y.], 11 (1910), No. 3, p. 160, figs. 2*).—The common and botanical name of each is given, together with notes on its special advantages and requirements.

Flowering shrubs for continuous effects, E. L. D. SEYMOUR (*Gard. Mag. [N. Y.], 11 (1910), No. 3, pp. 166–169, figs. 35*).—A planting table is given in which the best hardy shrubs are arranged according to the color of the flowers and their season of bloom. The character of the flower, height of the plant, habit of growth, and cultural notes are also given, together with illustrations of a large number of the more desirable kinds.

On the making of gardens, G. SITWELL (*London, 1909, pp. VIII+109*).—A popular essay on landscape gardening, consisting of a study of old Italian gardens, the nature of beauty and the principles involved in garden design,

That rock garden of ours, F. E. Hulme (*London, 1909, pp. 327, pls. 50*).—A popular work discussing the making of rock gardens, including notes on the culture, character, and arrangement of a large number of plants suitable for the purpose.

The book of the sweet pea, D. B. Crane (*London and New York, 1910, pp. IX+136, pls. 17*).—A popular treatise containing detailed directions for growing sweet peas under glass and in the open. Consideration is also given to the history, evolution and literature of sweet peas, their use for exhibition and decorative purposes, and their pests and diseases. The best varieties are classified according to their colors and lists are given of varieties considered to be too much alike.

Bibliography of Danish horticulture, 1546–1908, C. Mariboe (*Fortegnelse over Dansk Havebrugslitteratur Fra 1546–1908. Copenhagen, 1909, pp. 57*).—This contains 456 separate references arranged under the following headings: Horticulture in general, periodicals and calendars, greenhouses and cold frames, storage of horticultural products, landscape gardening and laying out of gardens, the kitchen garden, the orchard, floriculture, plant diseases, reports, etc., together with an alphabetical index of authors.

FORESTRY.

Annual report of the director of forestry of the Philippine Islands for the period July 1, 1908, to June 30, 1909, G. P. Ahern (*Ann. Rpt. Dir. Forestry P. I., 1909, pp. 20*).—This consists of a progress report of forest operations conducted during the year by the divisions of administration and investigation, including statistics relative to the certification of public lands, utilization of forest products, amounts of important timber species cut, imports and exports of forest products, revenues, and expenditures.

Annual progress report upon state forest administration in South Australia, W. Gill (*Ann. Rpt. State Forest Admin. So. Aust., 1908–9, pp. 12, pls. 7*).—The report includes a general account of the year's planting and other forest operations, together with tabulated data showing the areas of forest reserves and plantations, the distribution of trees, and a financial statement for the year. Notes are also given on a number of New South Wales eucalypts.

Review of forest administration in British India for the year 1907–8, F. B. Bryant (*Calcutta: Govt., 1910, pp. 54*).—This is the usual annual review for the year 1907–8, relative to forest operations in the various provinces of India. It contains notes and data on alterations in areas, forest settlements, demarcation and surveys, the development of working plans, forest protection, silvicultural operations, and experiments and exploitation, together with a financial statement for the year. The aggregate area of all classes of forests at the close of the year was 237,809 square miles, or 24.2 per cent of the total area of British India.

Progress report of forest administration in the Andamans for 1908–9, H. K. Robinson (*Rpt. Forest Admin. Andamans, 1908–9, pp. IV+23*).—A statement similar to the above is presented relative to the administration of state forests in the Andamans during 1908–9.

Some features of forest working plans in India, and of forest regulation in the coniferous forest of the Himalayas, B. Moore (*Forestry Quart., 8 (1910), No. 1, pp. 41–57, fig. 1*).—A general account is given of the making of working plans in India, including some of the more important provisions of a special plan for coniferous forests in the Himalayas. It is believed that the methods discussed should contain valuable suggestions for foresters in the United States.

Tables showing the progress in working plans in the provinces outside the Madras and Bombay presidencies up to the 31st December, 1908, with special reference to the application of the various silvicultural systems, A. M. F. CACCIA (*[Indian Forest Dept.] Pamphlet 9, Working-plan, Ser. 3, pp. V+44*).

Instructions for making forest surveys and maps (*U. S. Dept. Agr., Forest Serv. [Pamphlet], 1910, pp. 51, figs. 9*).—These instructions are issued to members of the Forest Service of this Department with a view of securing uniform results in the making of forest surveys and maps. Information is given relative to the use of surveying instruments, including the necessary tables for making observations, the use of the hypsometer and gradometer, making measurements and field notes, the use of the plane table, map making, etc.

Preservation and utilization of the national forests, S. RILEY (*Proc. Colo. Sci. Soc., 9 (1909), pp. 159-180*).—A paper read before the Colorado Scientific Society.

Study of forest conditions in Kentucky, J. S. HOLMES and R. C. HALL (*Bien. Rpt. Bur. Agr., Labor, and Statis. [Ky.], 18 (1908-9), pp. 3-178*).—This is the second report on the joint study of forest conditions in Kentucky which is being conducted by the Forest Service of this Department in cooperation with the Kentucky State Board of Agriculture, Forestry, and Immigration. Thus far 6 forest districts have been covered in the work, the first of which was discussed in the previous report (E. S. R., 20, p. 543).

A report is here made on the 5 districts studied in 1908, including for each district an outline of the physiography, transportation and land classification, descriptions of forest types with recommendations for the management of each type, tabular data showing the present stand and output of lumber and other forest products, and detailed descriptions by counties. Articles discussing forestry for coal mine owners and the black locust in Kentucky are appended.

An introductory study on the distribution of the principal forest species of the Maritime Alps, J. SALVADOR (*Rev. Eaux et Forêts, 49 (1910), Nos. 4, pp. 97-113, map 1; 5, pp. 132-147, fig. 1*).—This consists of a summarized study of the principal forest species of the department of Maritime Alps with notes on the geographic distribution of each.

Petwun or trincomali wood (Berrya ammonilla), R. S. TROUP (*[Indian Forest Dept.] Pamphlet 12, Forest Econ. Ser. 5, pp. 8, pl. 1*).—An account is given of this species of wood relative to its synonymy, distribution, habitat, and botany, the grain, color, weight, strength, seasoning power, and durability of the wood, exploitation, yields, returns and uses. Petwun wood occurs in Burma and the Little Coco Island, and is also found in Ceylon. It is tough, elastic, and straight grained. In addition to its use for building purposes, it is employed in a large number of wood using industries. The bast fiber also furnishes a poor quality for cordage.

The dissemination of junipers by birds, F. J. PHILLIPS (*Forestry Quart., 8 (1910), No. 1, pp. 60-73*).—This article embraces the results of 6 years' regional studies in Michigan, Indiana, Illinois, Nebraska, South Dakota, and New Mexico, as well as data from other regions which have been supplied by observers along this line. The general conclusion is reached that birds are responsible for most of the dissemination of the junipers. A list is appended of birds that have been found to eat juniper berries.

On the afforestation of poor or unfavorably situated agricultural lands, THIELE (*Ztschr. Landw. Kammer Braunschweig, 78 (1910), Nos. 45, pp. 557-559; 46, pp. 570, 571; 48, pp. 594-596, figs. 4*).—A discussion of this subject with special reference to German conditions, including directions for planting forest trees.

Planting methods as a means of preventing the attack of the May beetle, D. TIEMANN (*Forstw. Centbl., n. ser., 32 (1910), No. 2, pp. 84–91*).—The author calls attention to the general recommendation that in establishing forest plantations the soil should be loosened as little as possible in order to render conditions unfavorable for the breeding of May beetles. He points out that the ball method of planting trees more nearly approaches this condition than any other, and outlines and discusses a series of planting experiments which might throw some light on the relative efficiency of different methods of planting in combating the insect.

Forest production, C. GIRERD (*Semaine Agr.* [*Paris*], *29 (1910), No. 1497, pp. 44–47*).—The author reviews the present status of forest production in France and discusses the need of increased forest areas.

The productivity of woodland soil, J. NISBET (*Sci. Prog. Twentieth Cent., 4 (1910), No. 15, pp. 504–510*).—The importance of humus in the maintenance of forest growth is pointed out and it is stated that "the best method of insuring a humus favorable to soil productivity is to grow timber crops in mixed woods consisting of kinds of trees suitable to the soil and situation, and capable of protecting the soil against the deteriorating effects of sun and wind; and in such mixed woods the beech has on the Continent been found to possess the most valuable properties regarding the conservation and the increase of soil productivity."

Experiments in tapping Ceara rubber trees, E. V. WILCOX (*Hawaii Sta. Bul. 19, pp. 7–20*).—In continuation of initial experiments with the Ceara rubber tree in Hawaii previously noted (E. S. R., 20, p. 245) the results are given of one year's experiments which were undertaken to demonstrate the yield of latex from Ceara rubber trees and to determine their commercial possibilities, as well as to study the relative value of different methods and times of tapping and the possibility of utilizing local Japanese labor in the work of tapping and collecting rubber. The work was conducted cooperatively by the station and the territorial division of forestry, in conjunction with the directors of 4 private rubber plantations.

Although it is generally recommended that trees should not be tapped until they are 6 to 8 years old, the majority of the trees tapped in the experiments were only 2 or 3 years old. One series of 80 trees was tapped by means of one vertical cut each day, the cut being about 7 ft. in length and extending from the greatest height the laborers could reach to a point near the ground. It required 36 hours and 40 minutes of labor to tap the trees, collect the latex and secure by coagulation $1\frac{1}{2}$ lbs. of rubber, but with experience this time was greatly reduced. Another series of 160 trees which were tapped with 2 vertical cuts in place of 1, required only 40 hours of labor and yielded 5 lbs. of prime rubber and $2\frac{1}{2}$ lbs. of scrap rubber, and gave profitable returns.

Tapping experiments made on some mature Ceara trees indicate that about $\frac{1}{3}$ oz. of dry rubber may be expected as a daily yield from each tree. From the data at hand, it is estimated conservatively that the Ceara rubber tree will not only grow and thrive in the Territory but will yield profitable returns.

With trees 4 in. in diameter, single vertical cuts can be made daily for 2 weeks in succession or 2 vertical cuts daily for 1 week. Comparisons of the "V" cuts with vertical cuts resulted in favor of the vertical cut as to yield, although there appears to be no difference between the two in the healing of the bark wounds.

The results as to time of tapping show the yield to be somewhat larger about daylight than at any subsequent time, the difference, however, being more noticeable on clear days with the bright sun than on cloudy cool days, when the

flow of latex is almost the same throughout the morning hours. The tapping work as a whole indicates that under ordinary conditions it will be profitable to tap trees from daylight until nearly noon.

A further test was made of the use of water-bags to wash down the latex. Although it appears that the yield may be somewhat increased and the flow maintained for a somewhat longer time by the use of water, the economy of the operation has not as yet been determined.

It appears that the flow of latex may be temporarily stimulated by applying nitrate of soda. In one case the nitrate was placed in the soil at a depth of 3 or 4 in. and at some distance from the trunk around each tree where it would most quickly become available to the roots. The weight of dry rubber from 3 trees which received ½ lb. of nitrate of soda each was 2.3 oz., from 3 trees receiving ¼ lb. each 1.3 oz., and from the 3 unfertilized trees 1.2 oz. The effect of the nitrate of soda upon the flow of latex was manifested within 48 hours. The test was repeated with similar results.

Experiments in retapping trees which have recently been tapped indicate that the Ceara rubber trees in Hawaii may be profitably tapped about 3 times annually. A study of the distribution of the latex tubes shows the tubes to be found almost exclusively in the bark outside of the cambium, so that it appears unnecessary to injure the cambium. The large number of connecting tubes between the main longitudinal trunk is conspicuous and accounts for the ready flow of latex from the tapping wounds in any direction. The use of intercrops, such as corn or soy beans or other legumes while the trees are maturing is advised both from the standpoint of economy and as a means of cultivating the trees. Samples of rubber from the 2 and 3 year old trees submitted to commercial firms compared favorably as to value with prime Para rubber.

The climatic and soil requirements of Hevea brasiliensis, A. ZIMMERMANN (*Pflanzer, 5 (1909), No. 13–14, pp. 205–211*).—A discussion of the climatic and soil requirements of Para rubber based upon data secured from rubber plantations in various parts of the Tropics, to which a bibliography of rubber culture is appended.

The author concludes that Para rubber is adaptable to those regions in the German colonies under 600 meters altitude, with a rainfall of about 2 meters, no long continued dry spells, and fairly moist winds. The soil should be fairly rich in humus.

On the effect of arsenical and sulphur fumes on vegetation, with particular reference to the Para rubber tree (Hevea brasiliensis) and Rambong (Ficus elastica), B. J. EATON (*Agr. Bul. Straits and Fed. Malay States, 9 (1910), No. 2, pp. 46–51*).—In view of the supposed deleterious effect of the fumes from the Chinese furnaces roasting low grade tin ores, a small furnace was erected in the grounds of the Institute for Medical Research and actual experiments conducted with a number of potted rubber plants.

The results of the experiment proved conclusively the harmful effect of these fumes. They do not show whether the injury is due to the arsenious acid or to the sulphur dioxid in the fumes, but in the author's opinion the latter was the more harmful. "The first noticeable effect is a spotting of the leaves, yellowish white spots being found on the surface, which gradually spread over the whole surface of the leaves, the latter eventually dropping off. The plants thus become quite defoliated. The leaves naturally grow again if the fumes are stopped, but if the fumes from the furnaces are continuous, as is the case in practice, then complete defoliation would occur, and the plant would subsequently die."

Rubber cultivation in Uganda, F. KAYE (*India Rubber Jour., n. ser., 39 (1910), No. 5, pp. 304, 306, 309, 310, figs. 5*).—A brief account of rubber cultivation in Uganda, including data on the growth of, and tapping experiments with, a number of rubber trees at the Entebbe Botanical Garden.

DISEASES OF PLANTS.

Recent investigations on plant diseases, F. C. STEWART (*West. N. Y. Hort. Soc. Proc., 54 (1909), pp. 77–81*).—An outline is presented of some recent investigations that have been carried on for the prevention of plant diseases, and notes are given on the value of self-boiled lime-sulphur mixture as a fungicide, a stock solution of lime-sulphur for the prevention of apple scab, the arsenical poisoning of fruit trees, and a number of diseases, among them apple leaf spot, crown gall, apple rots in cold storage, and black rot of grapes.

A list of parasitic fungi from the Swedish provinces of Söderman and Bohun, G. LAGERHEIM (*Svensk Bot. Tidskr., 3 (1909), No. 1, pp. 18–40, fig. 1*).—This list includes about 100 species of plant parasites, two of which are described as new, namely, *Chrysomyxa ramischiæ* on leaves of *Pyrola secunda* and *Uromyces flectens* on *Trifolium repens*.

What is Aspergillus glaucus? L. MANGIN (*Ann. Sci. Nat. Bot., 9. ser., 10 (1909), No. 4–6, pp. 303–371, figs. 15*).—A critical and experimental study has been made of the various molds which are generally grouped under the name *Aspergillus glaucus*. The author finds that with the exception of *Eurotium amstelodami* n. sp., the ascospore form of the mold, all the forms can be grouped together in one series, which should be united and maintained under the name of *A. glaucus*. This series would naturally include *A. oryzæ* and *A. flavus*, but they may be readily distinguished from the typical form by the shape and size of their conidia. *E. amstelodami* may be recognized from all other forms by the smallness of the conidia.

The wintering over of plant parasites, K. VON TUBEUF (*Naturw. Ztschr. Forst u. Landw., 8 (1910), No. 1, pp. 56–58*).—The author reports Cuscuta wintering over on the green parts of winter plants, the apple mildew in the buds of apple trees, and a rust (*Puccinia malvacearum*) in the rhizomes of its host.

A method of infection experiments with green plants, E. W. SCHMIDT (*Centbl. Bakt. [etc.], 2. Abt., 25 (1909), No. 14–18, pp. 426–430, figs. 2*).—The apparatus consists of a glass cylinder open at both ends and standing in a glass cup or vessel, in the bottom of which is a layer of sand and in the top a plug of cotton. The plant to be infected is placed inside the glass cylinder and the plug replaced. It is claimed that the plant can thus obtain the proper amount of moisture and air and yet be protected from outside infection.

New infection experiments with Uromyces dactylidis, W. KRIEG (*Centbl. Bakt. [etc.], 2. Abt., 25 (1909), No. 14–18, pp. 430–436*).—Teleutospores of *U. dactylidis* obtained from different regions were sown on species of Ranunculus, and the results are given, together with a discussion of the biological species of *U. dactylidis*. The infection experiments were successful with *Ranunculus sylvaticus*, *R. platanifolius*, *R. aconitifolius*, *R. alpestris*, *R. glacialis*, *R. repens*, and *R. bulbosus*.

Some anemone rusts, E. W. D. HOLWAY (*Gard. Chron., 3. ser., 47 (1910), No. 1205, p. 67*).—Attention is called to the investigations of Arthur and Tranzschel in America and Europe on the relationship of some of the Uredineæ, particularly of the species *Puccinia fusca* found on *Anemone nemorosa* and the rust *P. pruni-spinosæ* on cherry, plum, peach, etc. It is stated that Tranzschel in 1904 and Arthur later (E. S. R., 18, p. 50) showed that the Æcidium on Anemone was a stage in the life history of the plum rust. Another species has been

found by Tranzschel (E. S. R., 16, p. 384) occurring as Æcidium on Anemone and to be connected with *Ochrospora sorbi* on species of Pyrus.

The present theory regarding these rusts is that originally *P. pruni-spinosæ* was able to produce all its spore forms on both Prunus and Anemone, but that it has become so specialized that one form is limited for the uredo and teleutospore stages to Prunus, retaining its æcidial stage on Anemone, while the form on Anemone has lost its æcidial and uredo form and lives on Anemone only.

Biological investigations on the germinating power and germination of the uredospores and æcidiospores of the grain rusts, E. Schaffnit (*Ann. Mycol., 7 (1909), No. 6, pp. 509–523, fig. 1*).—This is a general discussion of the various conditions that may affect the germinating power and germination of the æcidiospores and uredospores of the grain rusts, such as ripeness and age of the spores, heat, wind, moisture, condition and influence of host, etc.

The leaf spot of clover and alfalfa (Pseudopeziza medicaginis), E. Voges (*Deut. Landw. Presse, 36 (1909), No. 80, pp. 854, 855, figs. 6*).—This very common disease of alfalfa is claimed by the author to be identical with a similar fungus (*P. trifolii*) on clover. He also claims that a form of Phyllosticta found on both alfalfa and clover is only an imperfect stage of the leaf-spot fungus (*P. medicaginis*). Cross inoculation experiments with pure cultures of the two Pseudopezizas on clover and alfalfa plants were successful. Cultures of the Phyllosticta on both hosts produced the Pseudopeziza apothecia and spores of the Pseudopeziza sown on the leaves of clover and alfalfa produced the fruit bodies (pycnidia) of the Phyllosticta form.

Cotton anthracnose investigation, H. W. Barre (*South Carolina Sta. Rpt. 1909, pp. 89–118, figs. 7*).—This is a progress report on the author's investigations, a preliminary account of which has been noted elsewhere (E. S. R., 22, p. 544). Detailed accounts are given of inoculation experiments to determine the method of infection and also of experiments conducted to test the possibility of disinfection through the treatment of the seed.

The author found as a result of his inoculation studies that the disease may be developed in the bolls at any age or on any variety when inoculated with spores through punctures in the boll wall. On entering the inoculated bolls the fungus attacks the lint, and later enters the seed coats, penetrating the endosperm and cotyledons. When flowers 10 hours after opening were sprayed with water carrying spores, 44 per cent of the bolls developed from such flowers were diseased. Where young bolls were inoculated in a similar manner, 53 per cent became diseased, the amount of disease varying with the age of the bolls at the time of inoculation. In both the artificial and natural infection the fungus enters through the lines of dehiscence of the bolls. Inoculation with a spray carrying spores had no effect on the bolls after they were three-fourths grown, and it is believed that natural infection must take place before or when the bolls are about half grown.

Studies of diseased seed in which attempts were made to destroy the fungus by treatment failed to give any practical results.

The investigations seemed to indicate that the fungus is unable to live more than 10 months on the old diseased bolls and seed in the field, and it is believed that a one year's rotation with clean seed would eliminate the disease.

Scolecotrichum graminis avenæ, F. Krause (*Centbl. Bakt. [etc.], 2. Abt., 25 (1909), No. 1–4, pp. 102–106, pl. 1*).—Oats in Western Prussia have for several summers been attacked by a fungus that forms yellowish brown spots on the leaves. An examination of the diseased tissues showed that these were due to *S. graminis avenæ*.

A pathological change in the embryo of wheat grains, U. Brizi (*Ric. Lab. Chim. Agr. R. Scuola Sup. Agr. Milano, 3 (1908), pp. 169–172*).—In the prov-

inces of Cremona and Milan, much of the wheat that was planted did not germinate, although the seed appeared sound and viable. A careful miscroscopical examination of the seed showed many very small hyalin, septate threads of some fungus in the various tissues of the wheat grains. Artificial cultures on gelatin gave fruit bodies similar to those of *Aspergillus fumigatus*. This fungus is supposed to have infected the grain when the ovaries were young and by subsequent growth to have sapped the vitality of the seeds until their viability was seriously injured.

The bacterial soft rots of certain vegetables, I (*New York State Sta. Tech. Bul. 11, pp. 251–368, figs. 10*).—A report is given of an investigation conducted jointly by the Vermont and New York State stations on the soft rots of cabbage, cauliflower, and turnips, and consists of two papers.

The Mutual Relationships of the Causal Organisms, H. A. Harding and W. J. Morse (pp. 251–287).—This report deals with the morphology and cultural characters of 43 strains of organisms represented by cultures from England, Germany, Holland, and various parts of the United States and Canada. These were derived from turnips, iris, rape, calla lily, cauliflower, and cabbage, all of which produce soft rots of their host plants. In all more than 12,000 cultures were studied.

From the action of the organisms on the media, it appears that there are six groups of one species, but a further study of the cultures will be necessary before a definite classification can be made.

Pectinase, the Cytolytic Enzym produced by Bacillus carotovorus and Certain other Soft-rot Organisms, L. R. Jones (pp. 289–368, figs. 10).—A report is given of studies on the enzym produced by *B. carotovorus*, which was isolated by various methods, such as heating, filtration, the use of germicides, alcohol precipitation, etc. In these investigations a detailed study was made of the enyzm as produced by the carrot-rot organism, including a comparison of its action when obtained in different ways apart from the living bacillus, after which a comparison was undertaken of the characteristics of the enzyms secured from soft-rot organisms of several other vegetables, and finally with the wall-dissolving enzyms produced by other bacteria, by fungi, and by germinating seeds.

A bibliography of the subject concludes the report.

The leaf roll disease of the potato and its outbreak in Austria, K. Kornauth and O. Reitmair (*Monatsh. Landw., 2 (1909), p. 78; abs. in Centbl. Bakt.* [*etc.*], *2. Abt., 24 (1909), No. 23–25, pp. 573, 574*).—The first serious outbreak of this disease in Austria appeared in 1908. A study was made and the following facts ascertained: The disease can be introduced into uninfected regions by the use of diseased seed potatoes, also by means of infected soil. Its recognition in the early stages is difficult, as there is no known criterion in all cases. Weather and soil conditions, so far as causing an outbreak, are without influence though they may affect its progress. No variety of potato has been found immune. The disease has spread over Germany, is now found in Austria and Hungary, and has done much damage to the potato industry of those countries.

Potato wart disease: The life history and cytology of Synchytrium endobioticum, J. Percival (*Centbl. Bakt.* [*etc.*], *2. Abt., 25 (1909), No. 14–18, pp. 440–447, pls. 3*).—Experiments on the growth and development of the parasite were carried on throughout the growing season. These experiments included germination of the resting sporangia, sori of sporangia, infection and effect on the host, and the cytology and development of the thick-walled sporangia.

According to the author the fungus, previously known as *Chrysophlyctis endobiotica*, should receive the name *S. endobioticum*.

The wart disease of the potato in England, E. Riehm (*Centbl. Bakt.* [etc.], *2. Abt., 24 (1909), No. 8–12, pp. 208–213*).—This is a brief review of data as to the potato wart disease. The author discusses the identity of *Chrysophlyctis endobiotica* with *Œdomyces leproides*, and concludes that the two are not identical. The entrance of the zoospores into the host plant has not been observed, but plasmodia were found in the diseased tissues. The fungus belongs to the Olpidiaceæ group. It is claimed that the resting sporangia can live for at least 6 years in the soil. The disease is spread by means of the soil and seed potatoes. The remedies are gas lime, quicklime and sulphur applied to the soil. The article closes with a bibliography of the disease.

Crown rot, arsenical poisoning, and winter injury, J. G. Grossenbacher (*New York State Sta. Tech. Bul. 12, pp. 369–411, pls. 8*).—The author gives an extensive review of the literature relating to the subject, discussing frost, fungus, and arsenical injury to fruit trees, the disease having been attributed to all of these causes. He is inclined to believe that low temperatures are the primary cause of what is termed crown-rotted trees, but that there is need for a thorough investigation to determine the relationship existing between low temperatures, arsenical poisons, and various organisms to cankered and crown-rotted trees.

The author discusses preventive measures which have been proposed for this injury, consisting of early and thorough cultivation, followed by a cover crop in midsummer, and if possible the use of hardy, short-seasoned seedlings or crabs for stocks. The trees should be planted deep in order to protect the roots as much as possible from cold.

The gummosis of citrus orchards, L. Savastano and B. Majmone (*Bol. Arbor. Ital., 5 (1909), No. 2, pp. 68–73*).—The authors discuss the formation of gum on citrus fruit trees and reach the conclusion that it is due to 3 distinct factors, (1) a bacteriological agent (probably *Bacterium gummis*), (2) a breaking down of the cellular tissue due to the excessive formation of cell sap, and (3) external causes such as blows, wounds of insects, and pruning.

The apple scab, A. Bretschneider (*Wiener Landw. Ztg., 59 (1909), No. 100, pp. 980, 981, fig. 1*).—A general description of the macroscopic and microscopic characters of *Fusicladium dendriticum* is given, accompanied by figures showing its various fruiting stages, and the gross appearance of the fungus on the leaves and fruit. Varieties of apples that are more or less resistant to the disease are named and means of control suggested.

Apple scab, E. Wallace (*Rpt. Niagara Sprayer Co. Fellowship, 2 (1909), pp. 10, figs. 14*).—A popular description of the disease and its methods of infection is presented, accompanied by figures showing the gross and microscopic characteristics of the fungus on the leaves and fruit, and the results obtained by using various sprays. Tables are given showing the comparative results as to scab and insect injuries obtained during 1909 with Bordeaux and lime sulphur sprays to each of which arsenate of lead had been added.

The investigations showed that commercial lime sulphur (Niagara brand, "heavy grade") diluted 1 : 30 was as effective as Bordeaux 3 : 4 : 50 in preventing the scab, and caused no injury to the fruit or leaves, while the Bordeaux seriously russeted the fruit. The arsenate of lead used with the lime sulphur was fully as effective in controlling the codling moth as when used with Bordeaux, and caused no burning of fruit or foliage. The combination of the arsenate with the lime sulphur did not appreciably diminish the insecticidal and fungicidal value of either.

Fire-blight remedies, H. H. Whetzel (*West. N. Y. Hort. Soc. Proc., 54 (1909), pp. 119–126, figs. 3*).—Under the author's direction experiments have been carried on at the New York Cornell Station to test some of the proprie-

tary materials advertised as of value for the control of fire-blight of pears and apples.

One mixture, called Blight Specific, for which great claims have been made, was tested, and it was found that it not only failed to control the disease, but also that as a result of its use the trees seemed to suffer positive injury through the blackening of the wood. A chemical analysis of the substance showed that it consisted of over 92 per cent sulphur together with some powdered charcoal and asafetida. So far as New York conditions are concerned, the author thinks that it is worthless for the control of the pear blight and is actually injurious to the bark and wood of the trees, making serious wounds into which rot fungi gain entrance.

The apoplexy of the grape in Anjou, E. Vinet (*Rev. Vit., 32 (1909), No. 835, pp. 676–681, figs. 3*).—This disease is quite prevalent in Anjou and is gradually destroying many vineyards. The claim is made that the dead stems show necrosis of the tissues but that the disease is not found in the roots. Old stems that are dying from this cause are often found infected with two species of the higher fungi, *Polyporus versicolor* and *Stereum hirsutum*, the mycelia of which were found ramifying throughout the necrotic tissues, and the question is raised as to whether they are not a secondary cause of the death of the vines.

The vine growers of that region have found the following remedies of much value in combating the disease: Destruction of badly diseased, old, and dying plants, rigorous pruning away of the affected portions on the younger living vines, sterilization of all wounds by painting them over with coal tar or other antiseptic, and the treatment of the cut surfaces of the cuttings with a solution of 30 to 35 per cent of sulphate of iron.

The black rot of grapes, D. Reddick (*West. N. Y. Hort. Soc. Proc., 54 (1909), pp. 127–134, figs. 3*).—A description is given of the black rot of grapes, with suggestions for its control.

The physical and chemical composition of grapes when diseased by Oïdium, R. Averna (*Bol. Arbor. Ital., 5 (1909), No. 2, pp. 87–90*).—Several varieties were analyzed. It was found that the disease materially reduced the average weight of the bunches and the seeds, decreased the amount of sugar, tannin, and tartaric acid produced, made the yield of the must less and almost completely destroyed the coloring matter, but increased the amount of lees and the acidity of the product.

[Cooperative spraying experiments], L. R. Taft (*Michigan Sta. Rpt. 1909, pp. 152–157*).—An account is given of some cooperative spraying experiments for the prevention of black rot, the experiments having been begun as a result of observations made on the disease in 1905. The first year's experiments were not very accurately conducted and the results were not deemed conclusive, but in 1907 and 1908 the spraying was much more carefully done and the results fully justified the efforts made for controlling the disease.

For spraying vineyards it is believed advisable to use a 4:4:50 Bordeaux mixture for the earlier sprayings, the amount to be reduced to 3:3:50, or if spraying is required after July 15 to 2 lbs. of copper sulphate to 1 lb. of lime in 50 gal. of water. The amount required for spraying an acre of grapes will vary, but in general about 50 gal. per acre will be required during the early part of the season and from 60 to 80 in subsequent applications. The estimated cost of spraying an acre with 5 applications of Bordeaux mixture as recommended above is $4.90.

In addition to spraying with Bordeaux mixture, some observations have been made on dust sprays and on lime-sulphur solutions, but nothing was found as valuable as Bordeaux mixture prepared in the way recommended above.

Observations on some diseases of the olive, L. Petri (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat., 5 ser., 18 (1909), II, No. 12, pp. 635–642, figs. 4*).—The author notes 4 different diseases of the olive, a new leaf spot (*Phyllosticta oleæ* n. sp.) which produces white spots on the growing leaves, a bacteriosis of the fruit in which the infection is supposed to be produced by insect punctures, an anatomical alteration of the twigs and branches of the olive produced by a coccid (*Pollinia pollinii*), and a new parasitic fungus on the root tips of the olive trees.

The rootlets attacked by the disease last-named present a brush like appearance at first, which soon develops into a mycorrhiza that finally produces a coralloid condition of the rootlets. By the end of summer these rootlets turn black and absorption ceases. The fungus belongs under the Plectascineæ and is described as a new genus and species, *Cryptoascus oligosporus* n. g. and sp. The perithecia are black and are borne on the rootlets of the diseased plants.

The splitting of oranges in 1908, L. Savastano (*Bol. Arbor. Ital., 5 (1909), No. 2, pp. 83–87, figs. 5*).—The usual splitting of oranges is caused by an excessive absorption of water by the fruit and a consequent rupture of the skin of the orange from internal pressure. In 1908 in the Province of Sorrentino, the season was very dry and hot, and the fruit for that reason did not reach its usual size but ripened prematurely and showed much splitting. This splitting is claimed to have been produced by the long drought in most instances, but in a few cases it seemed to have originated from an abnormal carpellary proliferation that thrust itself outward against the surface of the orange and finally split it.

Peach leaf curl, E. Wallace (*Rpt. Niagara Sprayer Co. Fellowship, 1 (1909), pp. 8, pls. 3, fig. 1*).—These experiments were undertaken to obtain data relative to the efficiency of lime sulphur sprays as compared with Bordeaux mixture, and to determine what dilution can most profitably be used. The experiments were carried on under the direction of the New York Cornell Station under a fellowship established by the Niagara Sprayer Company, and the applications were made April 5 to 12. The trees of each plat received only one application of the spray. The results of spraying with lime sulphur 1 : 9, 1 : 12, 1 : 15, and 1 : 20, respectively, are given, and compared with those obtained by using Bordeaux 3 : 3 : 50.

The lime sulphur 1 : 15 controlled the leaf curl as well as the 1 : 9, and even 1 : 20 compared favorably with the stronger solutions, and gave a lower percentage of the curl than the Bordeaux in other orchards. In the experiments where lime sulphur and Bordeaux were sprayed on the trees the same day, the results were in favor of the lime sulphur. The percentage of diseased leaves was reduced from 41.3 to 5.3 by the 1 : 15 lime sulphur and to 8.3 on the Bordeaux plat. It is considered as demonstrated beyond doubt that proper spraying with either 1 : 9 or 1 : 15 lime sulphur effectually controls the curl and at the same time acts as an insecticide, especially for the San José scale.

A report on the chestnut tree blight, J. Mickleborough (*Harrisburg: Penn. Dept. Forestry, 1909, pp. 16, pls. 2*).—A report is given of investigations carried on to ascertain the presence of the chestnut tree disease (*Diaporthe parasitica*) in the valleys of the Delaware and Susquehanna rivers in Pennsylvania. Accompanying the report is an account of the life history, propagation, and damage already done by this disease, and suggestions for remedial treatment.

The author has not found the blight north of South Mountain in the Susquehanna Valley. In the Delaware Valley diseased trees were found at a number of places, but nowhere has it been so destructive as in New York, especially on Long Island.

Observations have shown that the fungus is parasitic only on the chestnut, and the variety Paragon seems quite susceptible. While the Japanese varieties are not immune, they are more resistant than the native ones, so far as observed.

Contribution to our knowledge of the willow Melampsora of Switzerland, O. Schneider-Orelli (*Centbl. Bakt.* [*etc.*], *2. Abt., 25* (*1909*), *No. 14-18, pp. 436-439*).—The author divides the group morphologically into three divisions: (1) Teleutospore membrane not thick, uredospores long; (2) teleutospore membrane not thick, uredospores round; (3) teleutospore membrane at the apex very thick, uredospores round. A brief discussion of the various biological species of Switzerland is given.

A new leaf disease of the pine (Pinus silvestris), E. Münch and K von Tubeuf (*Naturw. Ztschr. Forst u. Landw., 8* (*1910*), *No. 1, pp. 39-44*).—This disease, which causes the needles to turn brown and fall prematurely, is described as due to a new species of fungus, *Hendersonia acicola.*

The making and application of Bordeaux mixture, E. S. Salmon (*Jour. Bd. Agr.* [*London*], *16* (*1910*), *No. 10, pp. 793-810, figs. 17*).—Directions are given for making Bordeaux mixture and suggestions for its proper application. The author states that the ready-made Bordeaux mixtures on the market are not so efficient as the fresh homemade mixture, and that the powdered forms are of relatively little value as fungicides.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

Report of territorial entomologist, A. W. Morrill (*Southwest. Stockman, 28* (*1909*), *No. 25, pp. 1, 6, 7*).—This is a report on entomological conditions in Arizona with recommendations concerning the work of the horticultural commission. The Florida, California, and Cuban conditions as related to the possible introduction of insect pests into Arizona are reviewed, and the value of inspection in excluding dangerous pests, the treatment of nursery stock by fumigation or insecticide washes, and the defoliation of citrus and other white-fly food plants are discussed.

It is concluded that the best interests of citrus growing as an industry in Arizona can be safeguarded only by an absolute quarantine against the importation of citrus nursery stock from all sections known to be infested with dangerous pests. Such action is recommended to the commission provided that in the judgment of its members this would receive the moral support of those who have permanent interests requiring protection.

Twenty-fourth report of the state entomologist on injurious and other insects of the State of New York, 1908, E. P. Felt (*N. Y. State Mus. Bul. 134, pp. 206, pls. 17, figs. 22*).—During the season under report fruit trees in some sections of the western part of the State were seriously injured by the cigar case bearer. The fall cankerworm was unusually abundant and destructive on eastern Long Island and in the vicinity of New York City. The warm dry weather in the latter part of the season was favorable to the unrestricted multiplication of the San José scale and in some cases infested orchards became very badly affected. An unprecedented outbreak of the grape blossom midge destroyed from 50 to 75 per cent of the blossoms on an acre of Moore Early grapes at Fredonia.

Ravages by the elm-leaf beetle were very severe in many Hudson valley cities and villages. The extensive outbreaks by the green-striped maple worm, previously reported, continued in southern Rensselaer County. The depredations by the snow-white linden moth, previously reported, were continued in the

Catskills and extensive injuries were reported from the Adirondacks. Seventy-five species of gall midges were reared during the year.

An account is given of the life history and habits, with descriptions of the several stages, of the poplar sawfly (*Trichiocampus viminalis*) which has become rather abundant upon Carolina poplars in the vicinity of Albany, also of the grape blossom midge (*Contarinia johnsoni*) which was reared for the first time. An aphid, which has for 2 or 3 years caused more or less injury to gladioli bulbs by weakening them, has been found to represent a new species and is here described as *Aphis gladioli*. The pest is apparently unable to breed at the ordinary temperature of the warehouses, but as spring advances and the houses begin to warm up in March the aphids appear in large numbers. Fumigation with sulphur has been found inefficient in controlling this species. Two specimens of a Central American cockroach (*Panchlora hyalina*) are reported to have been taken in different sections of Albany. A somewhat extended account is given of the typhoid or housefly, and its biology and relation to disease transmission, to which an annotated bibliography of 80 titles is appended.

Under notes for the year the author considers some of the more important outbreaks. Of fruit tree insects, the occurrence of the gipsy and brown-tail moths in Massachusetts, cankerworms, cigar case bearer, and blister mite (*Eriophyes pyri*) are noted. The grape rootworm (*Fidia viticida*) is said to have caused less injury than during the previous year. The shade-tree insects reported upon are the elm-leaf miner (*Kaliosysphinga ulmi*), elm-leaf beetle (*Galerucella luteola*), bagworm, fall webworm, white-marked tussock moth, snow-white linden moth (*Ennomos subsignarius*), and spruce gall aphid (*Chermes abietis*). White ants are reported to have caused heavy losses in the storage vaults of a New York City printing company, where they riddled blocks upon which the electrotypes were mounted and ran galleries through files of back publications. Mention is also made of the occurrence of the corn worm (*Heliothis armiger*) and of the work conducted in the State against mosquitoes.

A list of the publications of the entomologist and of additions to the collections from October 16, 1907, to October 15, 1908, are also given. In Appendix A (pp. 71–75), J. G. Needham describes two May flies as *Siphlonisca aerodromia*, n. g. and n. sp., and *Potamanthus inequalis* n. sp. Appendix B (pp. 76–159) consists of a catalogue of the described Scolytidæ of America, north of Mexico, by J. M. Swaine.

Some new fruit pests and other bug notions, M. V. SLINGERLAND (*West. N. Y. Hort. Soc. Proc., 54 (1909), pp. 89–96, figs. 3*).—Attention is called to the fact that more than one-half of the more destructive insect pests of the United States are of foreign origin and that the increasing international commerce in plants and fruits is yearly adding to the list of injurious insects in this country.

Mention is made of the occurrence of a plum leaf miner (*Nepticula slingerlandella*), which recently appeared in destructive numbers in a large plum and prune orchard near Rochester, N. Y. The insect attacks only plum and prune foliage, pears and apples nearby showing no mines. A red bug (*Heterocordylus malinus*) appeared during 1908 and destroyed at least 25 per cent of the Greenings, Pound Sweets, and Ben Davis apples in an orchard near Syracuse, and practically the whole crop of Greenings in an orchard near Ithaca was punctured to death by the bugs and dropped soon after the fruit set. Its destructive work is said to have been practically all accomplished in May. Other species briefly considered are an apple seed pest, brown-tail moth, San José scale, codling moth, and lesser apple worm,

[Monthly bulletin of the division of zoology], H. A. SURFACE (*Zool. Bul. Penn. Dept. Agr., 7 (1909), Nos. 1, pp. 3–31; 2, pp. 35–64; 3, pp. 67–96; 4, pp. 99–128; 5, pp. 132–160; 6, pp. 163–192; 7, pp. 195–224*).—In these numbers are considered, respectively, plant pest treatment; short articles on economic entomology; nursery and orchard inspection, etc.; fumigation, the control of plant pests, and bee keeping; fumigation of buildings, and hunting and game laws; results of experiments with lime-sulphur solution, and how to destroy San José scale; and reports of Pennsylvania orchard inspectors.

Spermatogenesis in Acrididæ and Locustidæ, H. S. DAVIS (*Bul. Mus. Compar. Zool., 53 (1908) No. 2, pp. 59–158, pls. 9, figs. 7; abs. in Jour. Roy. Micros. Soc. [London], 1909, No. 6, p. 713*).—A full account is given of spermatogenesis in *Dissosteira carolina*, with notes on points of special interest in six other species studied.

Catalogue of the Hemiptera (Heteroptera), with biological and anatomical references, lists of food plants and parasites, etc., G. W. KIRKALDY (*Berlin, 1909, vol. 1, pp. XL+392; rev. in Ent. News, 21 (1910), No. 3, pp. 140–143*).—This volume deals with the Cimicidæ (Pentatomidæ), which includes the families which have been known as Pentatomidæ, Scutelleridæ, and Cydnidæ. It is prefaced by a discussion on nomenclature and an analytical table of families. The review is by E. P. Van Duzee.

Chinch bug, J. B. PARKER (*Kansas Sta. Circ. 5, pp. 6, fig. 1*).—A brief account is given of the chinch bug and means for its control. In 1909 it was the source of much damage in the corn belt of the State, the loss in the counties infested being estimated at from 5 to 50 per cent of the crop. The damage was reported to be heaviest in the southern part of the belt, particularly in Sumner County, where the estimates varied from 20 to 85 per cent of the corn crop.

Investigations showed that the fungus disease due to *Sporotrichum globuliferum*, though present among the bugs, does not always control them. It is recommended that cornstalks, instead of being burned, be plowed under in the fall or early winter. As soon as the grass becomes thoroughly dry, fire should be run over all pastures, meadows, roadsides, and waste lands on which are found bluestem, bunch grass, or other native clump-forming grasses, in which the chinch bug may hibernate.

The corn and cotton root louse in South Carolina, A. F. CONRADI (*South Carolina Sta. Rpt. 1909, pp. 51–65*).—Following complaints of injury by this pest during 1908, investigations have been conducted since the spring of 1909 at Marion in cooperation with the Bureau of Entomology of this Department. During 1909 the damage was more severe than in 1908 and besides the heavy infestation in Marion County, reports of injury were received from Sumter, Saluda, Colleton, and Lee counties.

During the investigation 3 forms of attendant ants were found, namely, *Lasius niger americanus*, *Pheidole dentata commutata*, and *L. claviger*, the first named being the most common, and one or more of the 3 species being in attendance in nearly all cases. Records were made of the food plants of the aphis, principally from the vicinity of Marion, an annotated list being given of the 25 host plants discovered.

The corn root louse was found to be most injurious in localities where crops are not rotated. If the field is frequently stirred after plowing and before planting, it will destroy volunteer plants upon which early colonies depend for subsistence. Winter plowing is considered to be the most practical method of controlling the pest in South Carolina where no crop rotation is easily adapta-

ble for controlling it. It is also recommended that some quick acting fertilizer be applied to stimulate the growth of the crop.

Scale insects injurious in Nebraska during 1906–7, H. S. Smith (*Ann. Rpt. Nebr. Hort. Soc., 39 (1908), pp. 159–169, figs. 6*).—Previously noted from another source (E. S. R., 20, p. 1146).

Peach tree borer, A. F. Conradi and W. A. Thomas (*South Carolina Sta. Rpt. 1909, pp. 124–127, figs. 3*).—Continuing data previously noted (E. S. R., 21, p. 157), the pupation and emergence of the pest during 1908 are shown by means of charts.

Catalogus dipterorum, C. Kertész (*Catalogus dipterorum. Leipsic, 1902, vols. 1, pp. 339; 2, pp. 359; Budapest, 1908, vol. 3, pp. 367; 1909, vols. 4, pp. 349; 5, pp. 200; 6, pp. 362*).—A catalog of the diptera of the world. Volume 1 takes up the Sciaridæ, Mycetophilidæ, Bibionidæ, Chironomidæ, Stenoxenidæ, Culicidæ, Ptychopteridæ, Dixidæ, Blepharoceridæ, Simulidæ, Orphnephilidæ, Psychodidæ, and Rhyphidæ; volume 2, the Cecidomyiidæ, Limnobiidæ, Tipulidæ, and Cylindrotomidæ; volume 3, the Stratiomyiidæ, Erinnidæ, Cœnomyiidæ, Tabanidæ, Pantophthalmidæ, and Rhagionidæ; volume 4, the Oncodidæ, Nemestrinidæ, Mydaidæ, Apioceridæ, and Asilidæ; volume 5, the Bombyliidæ, Therevidæ, and Omphralidæ; and volume 6, the Empididæ, Dolichopodidæ, and Musidoridæ.

Stomoxys calcitrans and Argentine cattle, L. Iches (*Bul. Soc. Nat. Acclim. France, 56 (1909), pp. 104–111; abs. in Jour. Econ. Ent., 2 (1909), No. 4, p. 305*).—The stable fly is reported to be the source of great annoyance to cattle in the province of Santa Fé. In an investigation made in 1908 the author found the pest breeding in the portions of screenings and chaff, left in the threshing of flax and wheat, which were near the soil and undergoing fermentation.

The development of Trypanosoma brucei in Glossina fusca, G. Keysselitz and M. Mayer (*Arch. Schiffs u. Tropen Hyg., 12 (1908), No. 13, pp. 532–535; abs. in Jour. Trop. Med. and Hyg. [London], 12 (1909), No. 10, p. 157*).—The authors were able to experiment only with adult flies caught in the open and which had apparently already bitten animals. They found that such flies when fed on infected animals yielded no higher percentage of infection than those fed on healthy dogs or even not fed at all. They conclude, therefore, that the trypanosomes can develop within the fly only once during the life cycle of the latter and that infection can occur only on the first occasion on which the fly sucks blood. About 10 per cent of the flies caught proved to be infected.

The forms of the trypanosomes found were always found in the proventriculus, and also in the proboscis and fore and hind intestine. The authors draw particular attention to the parasites which they found adhering to the walls of the proboscis near the opening of the salivary glands and entertain no doubt that the flies are mechanically inoculated at the time of biting.

Measures suggested against the Argentine ant as a household pest, W. Newell (*Jour. Econ. Ent., 2 (1909), No. 5, pp. 324–332, pl. 1, fig. 1*).—This is an account of simple measures which, in the course of 2 years' observations, the author has found to be effective. In discussing direct methods of destruction, attention is called to the fact that measures which will destroy the queens are necessary. Observations indicate that 1 per cent or less of the workers in a colony can keep the remaining individuals fully supplied with food.

In winter trapping, advantage is taken of the habit of the ant colonies to segregate or combine in the autumn, preparatory to passing the winter as large colonies, containing thousands of workers and larvæ and dozens or even hundreds of queens. These large colonies seek their domicile in well-protected locations favorable for passing the winter. As warm situations are particu-

larly attractive to them, about the first of October an ordinary dry goods box, about 2 by 2 by 3 ft. may be filled with cotton seed and straw, or other porous vegetable material, and placed near the center of an ordinary city lot or garden. If the top be left exposed to the weather the contents will become moist and the center of the mass become very warm as decay proceeds. This presents a nesting situation so attractive to the ants that practically all colonies within a radius of 30 or 40 yds. take up their abode in it as cool weather approaches. The number of fertile queens, which, during the winter of 1908, occupied a trap formed in this way is conservatively estimated as upwards of 1,000. In January, the cracks in the box were closed tightly, the top covered with a waterproof canvas, and a pound or two of carbon bisulphid poured into the box to destroy the colony. "So effective has this winter trapping appeared to be that we fully believe that if it were carried out uniformly by the residents of several or more contiguous city blocks acting in cooperation, few if any other measures would be necessary to hold the pest in reasonable check."

While much can be accomplished by destroying colonies during the summer months, steady and persistent effort is necessary, as the colonies are of comparatively small size and occur in every conceivable situation. Much may be accomplished by the use of carbon disulphid, decoy logs near which jars of honey have been placed, etc. "Sweetened preparations of soluble arsenic are of little direct use, as they kill the majority of the foraging workers taking them and little, if any, of the poison reaches the colony proper." In actual test, the author found tape treated with corrosive sublimate to successfully repel the ants for 11 months without being renewed. "Experiments have shown that solutions of sugar or molasses containing a small percentage of arsenic can be used to drive the ants from a room which the foragers persist in visiting. The best solution of this kind is made as follows: White arsenic, ½ gm.; cane sugar, 20 gm.; and water, 100 cc."

The insect and other galls of plants in Europe and the Mediterranean Basin, C. Houard (*Les Zoocécidies des Plantes d'Europe et du Bassin de la Méditerranée. Paris, 1908, vols. 1, pp. 1–569; 2, pp. 573–1247, pls. 2, figs. 1365; rev. in Science, n. ser., 31 (1910), No. 784, pp. 27, 28*).—In this work the cecidia are grouped with reference to the host plant instead of under the insects or other animals which cause their formation. "The host plants are arranged in accordance with Engler and Prantl's Pflanzenfamilien and under each species are given the cecidia which occur upon it, with cross references for those species of cecidia which occur on more than one host. Each family of host plants is preceded with a résumé of the characters of the cecidia which occur upon its species. The work records a total of 6,239 species, with descriptions of each. . . .

"Following each species of cecidia are the references to the bibliography. Each species is also accompanied by abbreviations which explain the part of the plant on which it occurs, whether it is simple or compound, whether the metamorphosis occurs in the cecidia or in the ground, the time required for its complete development, and the geographical distribution. . . . About one-third of the known genera of American cecidia are also common to Europe, but only a very few species are common to both the Old and the New World. . . .

"The work also includes a bibliographical index of nearly 400 authors and about 1,200 titles, index tables giving the orders, families, genera, and species of the organisms which cause the cecidia, and the families, genera, and species of the host plants."

The review is by M. T. Cook.

Insects injurious to strawberries, J. B. SMITH (*New Jersey Stas. Bul. 225, pp. 3–37, pls. 2, figs. 9*).—The author calls attention to the important part which insects play in the fertilization of the strawberry, and gives notes on the life history, habits, and means of control of injurious insects.

The strawberry weevil appeared in Cumberland County in 1893 in sufficient numbers to attract attention and has each year since caused injury at some point in the southern counties, the pine barren areas having been most affected. It has seldom been abundant in the same locality for more than 2 or 3 years in succession, after which there may be a period of equal or greater length during which it does not appear. It is shown that the eggs are deposited in the buds of staminate varieties only, following which the weevil crawls down the stem and punctures it about ¼ in. below the bud so that the latter withers and drops to the ground in a few days. Injury is not confined to the strawberry, but as the cultivated varieties are the earliest suitable plant that appears they are first attacked, and later, dewberries and various blackberries as well as wild strawberries. The injury has often been as high as 50 per cent of the early buds and occasionally higher. The fact that plants sprayed with Bordeaux mixture and Paris green are less injured than the unsprayed, is attributed to the repellent action of the mixture. Remedial measures suggested include the use of Bordeaux mixture and Paris green (4 lbs. of copper sulphate, 4 lbs. of lime and 50 gal. of water, with 1 lb. of Paris green or 5 lbs. of arsenate of lead to every 125 gal. of Bordeaux) just before the blossoming begins; the mowing and burning of the vines as soon as picking is over (before July 1); or the covering of the rows with muslin or other light fabric. It is thought that a much better prospect for avoiding injury lies in the selection of pistillate varieties for the bulk of the crop, with a profusely flowering staminate variety as a pollenizer. Clean culture is highly important as is the destruction of all wild blackberries and raspberry bushes in the vicinity of strawberry patches. The author considers it safer not to use a mulch unless the advantages from mulching counterbalance the injury from the weevil attack. The planting of very profusely flowering varieties so that there may be enough to feed the beetles and make a crop as well, and the planting of an early profusely flowering variety as a trap crop and burning this, are also suggested. *Catolaccus anthonomi* and *Sigalphus virginiensis* were bred in small numbers from the pest.

The strawberry leaf roller, though distributed throughout the State, is much more abundant south of the red-shale soil, but injurious only on the lighter soils of Burlington and other southern counties. The species, apparently of European origin, occurs at the present time from Canada to Virginia and probably farther south, and westward to the Mississippi Valley. The moths appear in the fields during May and deposit eggs upon the lower surface of the leaves, about 70 eggs being deposited by each female. These hatch in from 5 to 7 days. The larvæ wander to the upper surface of the leaf as soon as hatched, and, for a day or two, feed openly without protection, gnawing into the vein or alongside so as to weaken the tissue. They then begin to draw the upper surfaces of the leaf or lobe together by means of fine silken threads, to form a shelter, within which they feed, making the fold more secure and sometimes actually making a roll of an entire leaf. The larval stage lasts for about 4 weeks and the pupal for 9 or 10 days, thus requiring a period of from 42 to 50 days for development from egg to imago. There are 3 broods during the year, the third hibernating in the pupal stage. While the first brood, the moths of which appear in the strawberry field during the last days of June and early July, is almost entirely confined to strawberries, the second and third may be more abundant on the blackberry and raspberry. Their injuries on these latter

plants are all caused after midsummer. On strawberries only the first brood is really injurious in New Jersey, the second brood seeming to be controlled by natural checks, and the third finding so much food and growing so slowly that the plants do not show the effects of the feeding. On varieties in which the foliage is thin and scant, the injury is serious and may reach 75 per cent of the total crop and an impairment of 25 per cent in the value of the remainder. An ichneumonid parasite (*Porizon cooki*) was bred from the larva but does not occur in sufficient numbers to be of much importance. It has been found that in bearing patches, injury can be completely prevented by a single, properly timed spraying with arsenate of lead at the rate of 4 to 5 lbs. to 100 gal. of water. Spraying should be done within a week after the moths are noticed in the field, and just about the time when they are becoming abundant. By that time the eggs first laid will be hatched, but no leaves will yet be folded. This date is usually about May 10 in the southern counties and about May 15 in Burlington and Camden counties.

The strawberry root louse (*Aphis forbesi*) occurs in injurious numbers in the light sandy soils of the pine barren regions in the State, but is exceptional and seasonal. In New Jersey it usually winters in the egg stage. Hatching out early in April, the larvæ begin feeding on the leaves, and as they grow work their way down to the tender foliage of the crown and feed there, until in from 12 to 15 days they are full-grown and ready to reproduce. If the survival of the winter eggs is unusually heavy the crown may begin to show the effects of feeding when the second brood develops, especially if there are but few ants to transfer them to the roots, and this injury may become noticeable in the failure of the plants to develop. In a field containing many ant colonies even a slight original infestation may become serious. As this aphis, so far as known, occurs only on cultivated strawberry plants, land upon which strawberries have not been grown for 2 years will be free from infestation. If infested plants must be used they should be dipped, before planting, in a strong tobacco decoction. In order to make sure that no unhatched eggs are on the vines this must be done between April 15 and October 1, as the eggs will not be destroyed by the dip. Directions are also given for the fumigation of plants with hydrocyanic-acid gas, 1 oz. of potassium cyanid, 2 oz. of sulphuric acid, and 4 oz. of water per 100 cu. ft. of space being recommended, with an exposure of 10 minutes.

Complaints of injury by the strawberry white fly (*Aleyrodes packardi*) are said to have occasionally come from the more northern parts of the State. The strawberry leaf beetle (*Typophorus quadrinotatus*) which occurs throughout the State was injurious in 1909 through a limited area, but has not often appeared in harmful numbers. White grubs (May beetles) and 2 species of Harpalus are also mentioned as attacking strawberries.

[The rose chafer, grape-berry moth, and steel beetle], L. R. TAFT (*Michigan Sta. Rpt. 1909, p. 157*).—The experiments conducted during the last 2 or 3 years indicate that using 3 to 5 lbs. of arsenate of lead in 50 gal. of water, to which a quart of cheap molasses has been added, will destroy the rose chafer and prevent serious injury to grapes. If the application is made when the beetles appear in numbers they will leave the leaves and feed upon the poisoned water.

The grape-berry moth is reported to have caused considerable injury in 1907. A large number of growers have found that the pest can be controlled by spraying with arsenate of lead just before the blossoms open and again when the fruit has set.

The steel beetle sometimes appears in large numbers as the buds are swelling and causes injury by eating out the center of the bud, thus preventing the

growth of the new shoots. It can be controlled, however, by spraying regularly with arsenate of lead.

Spraying experiments, J. TROOP and C. G. WOODBURY (*Indiana Sta. Rpt. 1909, pp. 43, 44*).—One hundred and fifty-four 4 to 6 year old trees which were quite uniformly infested by San José scale were sprayed on March 7 and 8, four commercial products being used. "Target brand, contrary to the writer's former experience with this remedy, made a stable emulsion with water immediately upon mixing and proved very efficient against the scale. Bogart's sulphur compound did not emulsify satisfactorily and was very inefficient as a scale destroyer. The two brands of lime sulphur [Grasselli and Niagara] both diluted easily, but were not quite equally effective."

Spraying trees for the elm scale, S. B. DOTEN (*Nevada Sta. Circ. 6, pp. 6, figs. 3*).—This is a brief account of the European elm scale and its control, a more extensive account of which has been previously noted (E. S. R., 20, p. 655).

Experiments show that it is readily destroyed through spraying with a mixture of 20 lbs. of quicklime, 15 lbs. of flowers of sulphur, and 50 gal. of water. As the lime-sulphur mixture turns the paint of houses and fences black, it has been found advisable to use kerosene emulsions on cork elms close to dwelling houses.

Spraying, L. R. TAFT (*Michigan Sta. Rpt. 1909, pp. 150, 151*).—A brief account of the spraying work carried on during the year under report.

A chemical study of the lime-sulphur wash, L. L. VAN SLYKE, C. C. HEDGES, and A. W. BOSWORTH (*New York State Sta. Bul. 319, pp. 383-418*).—The work described in this bulletin was undertaken for the purposes of learning (1) how the composition of the lime-sulphur wash is influenced by conditions of preparation and (2) what is the composition of various commercial preparations. Preparations were made containing 125 lbs. of sulphur and 52, 60, and 65 lbs., respectively, of pure lime. The general results are summarized as follows:

"The specific gravity or density of the preparation and the amount of sulphur and calcium in solution increased with the amount of lime used.

"When the largest amount of lime was used, the compound present was mostly calcium tetrasulphid (CaS_4); when the smallest amount of lime was used, the mixture was more nearly pentasulphid (CaS_5).

"In the undissolved portion or sediment, free sulphur was present in largest amounts when the smallest amount of lime was used, and the amount decreased when larger amounts of lime were used. Calcium sulphite was present in smallest amounts when the least amount of lime was used."

Different mixtures were also boiled 45, 60, and 90 minutes, with the following results:

"The largest amount of soluble sulphids was formed by boiling about 1 hour, especially when the largest amount of lime was used.

"In general, increased length of boiling decreases the amount of thiosulphate and increases the amount of sulphite.

"The amount of sediment increases with length of boiling, owing to increased formation of calcium sulphite, etc. The amount of free sulphur in sediment decreases with length of boiling."

An examination was made of concentrated home-made mixtures and of dilute mixtures prepared according to the formula 15 lbs. of sulphur and 20 lbs. of commercial lime, but the results were not as satisfactory as in case of the other preparations already described, probably because of the use of impure lime. In the case of the 15:20 formula, the sulphid compounds of calcium

appear to be decomposed, forming compounds containing much less sulphur than the tetrasulphid (CaS_4).

A concentrated solution was diluted to 50 gal., using 8 gal. of water for 1 gal. of concentrate, and 10 lbs. of lime then added. "The amount of sulphid sulphur was decreased, while thiosulphate was increased with formation of free sulphur. The higher sulphids of calcium were decomposed, forming compounds containing less sulphur. The changes thus caused may be so great as to seriously decrease the insecticidal power of the mixture.

"When nearly pure lime is used, the sediment consists largely of calcium sulphite ($CaSO_3$), free sulphur, hydroxid, and carbonate of lime, and can be added to fresh amounts of sulphur and lime in making additional wash. This should not be done when the lime used contains magnesium compounds.

"Magnesium oxid does not form sulphids when boiled wtih sulphur. Some limited action takes place which results in producing hydrogen-sulphid gas. When magnesium oxid is present in lime, it tends to decompose and decrease the amount of sulphids of calcium found. Hydrogen sulphid gas thus produced is poisonous and may affect unfavorably the person who handles the mixture during boiling.

"Several samples of each of four different brands of solutions were examined. One brand contained varying amounts of sediment, one sample nearly 20 per cent. The percentage of soluble sulphids was found to vary from 16.5 to 25.6; in most cases the percentage was between 23 and 24. The sulphid compounds present were tetrasulphid (CaS_4) and pentasulphid (CaS_5), the proportions varying somewhat; on an average, the two compounds were present in approximately equal proportions.

"One sample of a dry powder was examined, the result showing that at the price charged the cost is higher than in case of the commercial solutions."

Concentrated lime-sulphur mixtures, P. J. PARROTT (*New York State Sta. Bul. 320, pp. 419–438, fig. 1*).—Tests of these mixtures are reported and discussed.

"Field experiments to test the value of the sediment of a commercial lime-sulphur mixture in controlling the San José scale demonstrated that the insoluble portion possesses very weak, if any, insecticidal properties on this pest. The sulphur sprays derive their chief insecticidal value from the soluble lime-sulphur compounds. The addition of the sediment of a commercial or home-made lime-sulphur wash as extra material has apparently no detrimental influence on the effectiveness of the clear solution. The strength of the diluted preparation should be based on the clear solution.

"On the basis of reasonable efficiency and cost, the strengths of effective mixtures for the San José scale, using a lime-sulphur solution testing 33° B., range from 1 gal. of the concentrate diluted with 8 gal. of water to 1 gal. of the solution diluted with 11 gal. of water. In orchards where the scale is not thoroughly controlled, the stronger mixtures are recommended. For spraying for the blister-mite, a dilution of 1 gal. of the concentrate to 11 gal. of water makes an effective spray.

"Present evidence indicates that the common spraying arsenicals do not materially affect the value of lime-sulphur mixtures. In spraying for the scale or blister-mite, an arsenical in the usual amount for orchard treatment may apparently be safely added to a diluted sulphur solution for the purpose of controlling the bud-moth and casebearers, which are now very destructive in many apple orchards.

"The second year's experiments with the home-made concentrated lime-sulphur wash gave satisfactory results on the scale and blister-mite. The different preparations showed some variation in the density of the solution and in the

quantity of sediment, requiring the use of a hydrometer to obtain diluted mixtures of definite strength. This method of preparing a sulphur spray has several advantages, and should be tested by fruit growers owning suitable cooking outfits, to determine its applicability under their own conditions."

Composition and use of lime-sulphur washes, F. H. Hall (*New York State Sta. Buls. 319, 320, popular ed., pp. 13*).—A popular edition of the bulletins noted above.

Inspection of nursery stock, S. B. Doten (*Nevada Sta. Circ. 5, pp. 2*).—The text of the Nevada law relating to the inspection of nursery stock, which was approved March 25, 1909, is given. All shipments into the State of nursery and orchard stock must bear certificates of inspection stating that they are free from insect pests and plant diseases.

Report of the economic zoologist, H. A. Surface (*Ann. Rpt. Penn. Dept. Agr., 14 (1908), pp. 129–197*).—An account is given of the work of the year including lists by counties of the nurseries inspected and licensed.

A code of colors for the use of naturalists, artists, etc., P. Klincksieck and T. Valette (*Code des Couleurs à l'Usage des Naturalistes, Artistes, Commerçants et Industriels. Paris, 1908, pp. 86, pls. 50; rev. in Pomona Jour. Ent., 1 (1909), No. 4, p. 137*).—This is a book of 32 pages of text and 50 plates on heavy paper, containing 720 block colors and a table of the 10 principal colors in 18 languages.

FOODS—HUMAN NUTRITION.

Food and drug products, 1909, J. P. Street (*Connecticut State Sta. Rpt. 1909–10, pt. 2, pp. 163–280*).—A total of 1,630 samples of food products and drugs were examined, of which the bulk were collected by the station or by the state dairy commissioner. Of the materials examined, 986 were not found to be adulterated, while 404 were considered adulterated or below standard and 139 compound. The food materials included among others breakfast foods, coffee, condensed milk, dessert preparations, gelatin, jelly powders, grape juice, lard, flavoring extracts, olive oil, peanut oil, sardines, sausage, sirup, codfish, and "temperance beverages." In the discussion of the analytical data, the character of the materials, the validity of the claims made for special food products, and similar topics are considered.

In the case of breakfast foods, it is pointed out that the ready-to-serve brands contain considerably more soluble carbohydrates than the other sorts and also more soluble ash, which is due to added salt. The ready-to-serve materials were found to be the more expensive, "on the average costing more than twice as much as the other foods. In each class the corn foods are the cheapest per calorie and the wheat foods the most expensive."

Gelatin, as the author points out, is derived from collagen, the chief constituent of connective tissue. "By proper treatment any form of connective tissue can be made to yield gelatin. Hide clippings yield glue, a crude form of gelatin, and much commercial gelatin is simply a purified glue, derived from such a source. Isinglass, obtained from the swimming bladder of the sturgeon and other fish, is the purest form of gelatin. The gelatin obtained from calves' feet, free from bone, is also of high quality.

"Gelatin is very soluble in boiling water, and on cooling sets into a jelly. This jellying will occur in a solution containing as little as 1 per cent of gelatin. . . .

"The cost of gelatin naturally depends upon the source from which it is derived, that from calves' feet being much more expensive than the usual com-

mercial gelatin, and that from isinglass being even more costly. Ordinary chemical analysis reveals little as to the source of the gelatin, and in . . . [the examination reported] no attempt has been made to solve that problem. A high ash would indicate an imperfect method of manufacture, and a low nitrogen content an impure article, but neither of these determinations affords definite information as to the quality of the gelatin."

Of the 16 samples examined, 6 did not satisfy the established standard, or were of short weight.

Jelly powders, according to the author, "consist chiefly of cane sugar, with sufficient gelatin to make a jelly, and are variously flavored and colored to simulate the flavor and color of natural fruits. As a rule their compound nature is more or less clearly indicated on the label."

The 12 samples examined on an average "contained 1.63 per cent water, 0.27 per cent ash, 8.52 per cent gelatin, and 88.95 per cent cane sugar, the three substances first named being almost entirely derived from the commercial gelatin used. It is evident, therefore, that these jelly powders on the average consist of about one part of commercial gelatin and nine parts of cane sugar. For this sugar the buyer pays on the average about 22 cts. per pound."

Both sweetened and unsweetened condensed milk were included in the 36 samples examined. With 5 exceptions, the sweetened milks met the legal requirements. "In 4 samples the percentages of fat in the calculated milk solids were abnormally low, although the percentage of fat in the condensed milk was normal."

Unsweetened condensed milk, as noted, should contain at least 7.75 per cent of fat. One of the samples contained less than this, while two others were slightly above the minimum. These three samples also contained considerably less milk solids than the standard required.

"The composition of a condensed milk depends not only upon the quality of the milk condensed, but also on the amount of this condensation. In sweetened condensed milk the concentration is carried much farther than in the unsweetened variety. It is important to determine the degree of condensation, as thereby a good idea may be obtained as to the composition of the original milk. The calculation of this factor is a comparatively easy matter in the case of unsweetened milk, for here we are dealing with the normal constituents of milk, and, excepting water, in normal proportions. In sweetened milk, however, containing varying amounts of cane sugar, the whole ratio of the constituent solids is changed and the problem is much more complicated." Various methods for determining this factor are discussed.

On the basis of the analytical data, the author discusses the uses and applications of condensed milk. "The labels of most of the brands of condensed milk give directions for its use as a drink, alone or with tea or coffee, as a cooking adjunct, or as a food for infants. . . . Of the sweetened milks [only one of the brands examined would yield when diluted with water] according to directions, a milk containing normal quantities of milk solids and fat, and even this would contain a great excess of cane sugar. The other sweetened milks would yield products containing from 5.5 to 8.8 per cent of milk solids, and from 1.5 to 2.2 per cent of fat; in other words, a mixture only a little over half as rich as milk of good quality. None of the brands can be diluted with more than 1.5 parts of water to 1 of milk and yield a product which equals fresh milk in fat content."

Of the unsweetened milks examined, only one, when diluted according to directions, would yield a product "approaching good milk in richness." A dilution of 1 part of milk with 3 parts of water can yield a milk of standard composition in none of the unsweetened milks [examined]. . . .

"For cooking purposes and for a beverage, deficiency in fat may be of comparatively minor importance, although the nourishing qualities of the milk are thereby reduced. In infant feeding, however, where fat is the most essential ingredient in the milk, and where cane sugar, in the opinion of many physiologists, is especially to be avoided, the composition of the milk obtained by following the manufacturer's directions is of the greatest importance."

As the author points out, specific directions for preparing mixtures suitable for infants from one week to one year old are given with a number of the brands examined.

"A comparison of the calculated composition of the mixtures made for infants of different ages, according to the directions indicated, with the composition of human milk at the same age periods, shows how deficient a diet, as compared with mother's milk, is furnished if the manufacturer's directions are followed. This criticism applies to every brand . . . , for in no case do they even approximate the composition of human milk in all the ingredients. Nor could this condition with the sweetened milk be remedied entirely even by the addition of cream, cod liver oil or some similar oil, and milk sugar, for there will always be an excess of cane sugar present, even when its addition is not specifically directed. The desirability of the presence of cane sugar in the diet of very young children is a matter of much controversy among physiologists, yet each of the four brands of unsweetened milk, which recommend a formula for infants one week old, directs that cane sugar shall be added, making up nearly two-thirds of the solids of the mixture."

[Food standards in Nevada], S. C. DINSMORE (*Nevada Sta. Circs. 2, 3, 4, 7, pp. 1 each*).—The topics discussed are the state standards for ice cream, flavoring extracts and soda fountain sirups, coloring matter in food products, and the labeling of food products artificially colored.

Food inspection decision (*U. S. Dept. Agr., Food Insp. Decision 113, pp. 2*).—This decision has to do with the labeling of whisky and mixtures, and imitations thereof under the food and drugs act of June 30, 1906.

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 134–140, pp. 14; 141–153, pp. 2 each; 154–155, pp. 3 each; 156–159, pp. 2 each; 160, pp. 3; 161–162, pp. 2 each; 163, pp. 7; 164, pp. 2*).—The subjects considered are the misbranding of "buchu gin," vanilla extract, cheese, lemon extract, a drug preparation, baking powder, evaporated apples, "mapleine," and pepper; the adulteration of almond extract, seedless raisins, raisins, vanilla extract, and peaches; and the adulteration and misbranding of lemon extract, vanilla extract, strawberry extract, terpeneless lemon extract, pineapple extract, tomato catsup, powdered asafetida, and peppers.

The value of the fishing industry in Germany as a means of conserving the meat supply, J. KÖNIG and A. SPLITTGERBER (*Landw. Jahrb., 38 (1909), Ergänzungsb. 4, pp. 1–169, pls. 6; abs. in Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. ser., 4 (1909), No. 19, pp. 744, 745*).—A large amount of data is summarized and discussed regarding the storing, curing, and preserving of fish, its composition and nutritive value, and its importance as food, and analyses are reported of fish and fish products, which include in some cases creatin and other meat bases, and the proportion of different nitrogenous constituents, as well as elementary analyses, in addition to proximate constituents. The heat of combustion of fish flesh was also determined as well as the composition, energy value, and constants of fish fat, and artificial digestion experiments with fish flesh were made in comparison with meat.

In general, the authors conclude that fish flesh is as easily and as well digested as meat and that it may constitute a very important source of nutritive material. Under German conditions fresh water fish sell for much the same

price as meat, while salt water fish are considerably cheaper. It follows, therefore, according to the authors, that sea fish must be selected if it is desired to lower the cost of the diet by using fish in place of meat.

The article as a whole is an exhaustive study, more particularly with reference to German conditions, of the value of fish as food from the standpoint of commercial importance, economy, and nutritive value, as shown by chemical composition.

The importance of fish as food, J. König and A. Splittgerber (*Ztschr. Untersuch. Nahr. u. Genussmtl., 18 (1909), No. 9, pp. 497–537, fig. 1*).—A condensation of the above.

A report on preservation methods employed in the European fish industries, J. König and A. Splittgerber (*Pure Products, 6 (1910), No. 1, pp. 9–16*).—The portion of the above article which has to do with the nutritive value of fish and with the cold storage, curing, and canning of fish is abstracted at length. Recipes are quoted for preparing a number of fish products.

Nutritive value of wheat, P. Hirtz (*Millers' Gaz., 33 (1909), Nos. 37, p. 452; 38, pp. 460, 461; 39, pp. 472–474*).—In this article, translated from the French, a number of analyses of wheat of different sorts are reported and discussed. Nearly all of the wheats analyzed contained more nitrogenous matter than the native wheats of the consuming European countries, and this was especially true with reference to the French wheats.

The occurrence of Oïdium and yeast on dried fruit, H. Kühl (*Pharm. Zentralhalle, 50 (1909), No. 51, pp. 1057, 1058*).—The author concludes from his investigations that bacteria are only occasionally found on dried fruit, whereas yeast and Oïdium are abundant.

East Indian food materials, M. Greshoff (*Bul. Kolon. Mus. Haarlem, 1909, No. 42, [p. 261], folio*).—Continuing earlier work, analyses are reported of a number of sorts of grains, poppy seed, pine nuts, vegetables, herring, butter, and other miscellaneous foods.

Concerning the absolute vegetarian diet of Japanese bonzes [monks], G. Yukawa (*Arch. Verdauungskrank., 15 (1909), Nos. 4, pp. 471–524; 5, pp. 609–646*).—The author was led to this study of Japanese vegetarian diet by the fact that some statistics of Japanese centenarians indicated that 46.5 per cent of the 200 persons included were strict vegetarians.

He selected as subjects 12 monks from Buddhist monasteries where the rules of celibacy and the avoidance of animal foods are still observed strictly, this no longer being the case except in certain communities. The men selected for the experiment ranged from 17 to 70 years of age, the average age of the young men being 26.2 years and of the older 63.6 years; the younger men had been monks for about 15 years and the older for about 55 years. Such cloistered monks, the author states, lead in general a very quiet life, with little bodily exercise. In addition to their religious services they cook their food, perform their household tasks, and when alms are collected they go about from house to house and from village to village. Three meals are eaten per day, and consist chiefly of rice or rice and barley with pickled radishes and other Japanese vegetables, rape seed oil, and soy bean products such as soy sauce and miso, the cooked rice and other dishes, as is usual in the Japanese diet, being commonly prepared with soy sauce. In one of the strict monasteries it is the custom for the monks to be given a 10-day period to rest every 2 months, during which time they refrain from physical exertion and have a better diet than at other times. It was such a period which was selected in the case of some of the subjects included in the dietary study.

The experiment as a whole covered 5 months and the individual dietary studies from 4 to 10 days. During the experimental period all the old men

and all except one of the younger men spent a large part of the time in absolute rest with their eyes closed engaged in meditation. On an average the diet of the 8 younger monks at rest supplied per man per day 483.1 gm. dry matter, 57.1 gm. protein, 14.6 gm. fat, 344.9 gm. carbohydrates, and 2.8 gm. alcohol, the total energy value being 1,804 calories. The weight of these men on an average was 44.46 kg. (97.8 lbs.). In the case of a young monk with light work and weighing 52.1 kg. the diet supplied 758.8 gm. dry matter, 86.5 gm. protein, 21.2 gm. fat, and 531.1 gm. carbohydrates, the energy value being 2,731 calories. In the case of 3 old men at rest the diet supplied 529.4 gm. dry matter, 60.4 gm. protein, 12.3 gm. fat, 346.9 gm. carbohydrates, and 33.2 gm. alcohol, the energy value being 2,020 calories. The average weight of the old men was 51.82 kg. (114.2 lbs.). If the values for protein and energy in these diets are reduced to a uniform basis of 150 lbs. body weight, they become 87.5 gm. protein and 2,769 calories per day for the young monks at rest, 113.2 gm. protein and 3,574 calories for the young monk at light work, and 79.3 gm. protein and 2,654 calories for the old monks at rest.

In connection with his dietary studies the author determined the digestibility of the food and the excretion of nitrogen and other constituents in the urine and discusses his results on the basis of body weight and surface area. Considering digested nutrients, the diet of the young monks at rest supplied 38 gm. protein and 1,659 calories; that of the young monk at light work 63 gm. protein and 2,547 calories; and that of the old monks at rest 41.2 gm. and 1,872 calories.

From the investigation as a whole the conclusion is reached that the absolute vegetarian diet of these Japanese monks, though supplying what he considers a minimum amount of energy, was nevertheless sufficient for maintaining the men in good health. The author concludes, however, that the fact that the whole organism and particularly the digestive tract were by custom adjusted to such a diet plays an important part in the result.

The report is supplemented by a bibliography.

The principal foods utilized by the natives [of Taytay], E. D. MERRILL (*Philippine Jour. Sci., B. Med. Sci., 4 (1909), No. 4, pp. 219–223*).—In this study of the habits of Filipino natives the author has collected and summarized data regarding the principal foods used by the natives of Taytay and enumerates and identifies different species of fresh fruits, vegetables, pot herbs, and condiments which they use. Taytay is regarded as characteristic of the medium-sized and small settlements in the Philippines and its food supply seems to be from local sources.

"Here, as in nearly all other parts of the archipelago, rice is the basis of the meal, and fish, both fresh and dried, apparently ranks as the second most commonly utilized food. The town is situated in the midst of a large rice growing region, and the supply of this staple is practically all local, although in times of scarcity foreign rice is brought from Manila. Comparatively few varieties of rice seem to be cultivated locally, at least in any great quantity.

"Most of the fresh fish found in the local markets, and apparently most of the dried fish, are fresh water varieties secured in Lake Bay, although some dried fish originating in salt water is brought from Manila. . . .

"Meats play a very secondary part in the local dietary as in other parts of the Philippines. Apparently the only local supply that is at all constant is of fresh pork; pigs, both large and small, being abundant in the town and always offered for sale on market days. Goats are utilized for food to a limited extent. Beef is apparently never, or at least very rarely, offered for sale in the local market; a meat closely resembling it—that is, the meat of the water

buffalo or carabao—is probably sold at times here as in other Philippine towns, but the supply must be very limited. . . .

"Fowls, especially chickens and ducks, are found abundantly locally and are considerably utilized for food, especially among the natives of the well-to-do classes, while eggs, both fresh and 'balut' (incubated) are somewhat used. The comparatively high price of all meats, poultry, and eggs places these products beyond the means of the average native of the laboring class for regular articles of diet."

Various cakes and other sweet or starchy foods and similar materials are sold in the market, the author states, but wheat bread is used scarcely at all and may not be considered to have any place in the dietary of the average native.

"Dairy products such as milk, butter, and cheese have no place in the dietary of the natives, except the former, which is obtained from the water buffalo and is used to a limited extent. . . .

"Fresh potatoes, onions, etc., although always to be found in the Manila market, are rarely obtainable locally, and then only in very limited quantities."

The list of fruits, vegetables, and pot herbs is a fairly long one, but according to the author, "of the entire list of fruits . . . , bananas, mangoes, and pineapples are the only ones that can be ranked as first-class fruits from an edible standpoint."

The food of the people of Taytay from a physiological standpoint, H. Aron (*Philippine Jour. Sci., B. Med. Sci., 4 (1909), No. 4, pp. 225–231*).—Continuing the work referred to above, the author has collected and summarized data regarding the food habits of Filipino natives and the nutritive value of their ordinary diet, his estimates of quantities eaten being based upon the amounts expended for daily staple foods and the local market prices. The amount of nitrogen was determined in several species of fish, fresh and cured, used by the natives.

"In making a study of the food and its nutritive value for these people, one has to consider principally the quantity of rice and fish eaten daily. The protein material found in the vegetables and fruits can be neglected and the protein in the few eggs occasionally eaten is too small in amount to be of any importance. However, the caloric value of the sugar and the sugar preparations and of the carbohydrates found in vegetables and fruits can not be disregarded altogether. . . .

"The average amount of rice per person is about 700 gm. [which would supply 50 gm. protein and 2,000 calories], but for a hard-working man it is somewhat higher, from 850 to 900 gm. The fish eaten by the people of Taytay deserves our attention especially as a source of protein, the content of fat in the Philippine fishes being very low, at the most only 1 to 2 per cent; this means that the fish contains only one-tenth as much fat as protein. . . . The amount of fish eaten per person can not be determined with the same accuracy as the amount of rice," but the author concludes from available data that the amount eaten on an average per day will supply 40 gm. protein. He concludes further that the other vegetables and foods eaten in addition to fish and rice would supply about 500 calories per person per day, so that the total daily diet of the average person would supply about 90 gm. protein and 2,700 calories of energy. The somewhat larger quantity of rice used in the diet of a hard-working man would make the nutritive value of the average daily diet 100 gm. protein and 3,100 calories, according to the author.

"Practically all the rice used in this town belongs to the class of 'cured' rice, which according to some observers never causes beriberi even when it forms the greater portion of the nutriment over a long period of time. The rice

is prepared at home and is unpolished; polished or 'uncured' rice is found only very rarely. . . .

"The cost of the food for one person ranges between 9 and 16 centavos daily, with an average of 12½ centavos per person. . . . In a provincial town a Filipino can live very comfortably on about 12 centavos a day." See also a previous note (E. S. R., 21, p. 768).

General sanitary conditions [in Taytay], P. Clements (*Philippine Jour. Sci., B. Med. Sci., 4 (1909), No. 4, pp. 247–255, pls. 4*).—In a discussion of the general sanitary conditions in this Philippine village the author summarizes a considerable amount of data regarding the kinds of foods used and their preparation, the construction of houses, water supply, the disposal of refuse, and related topics.

Summary and conclusions [regarding the native village of Taytay], R. P. Strong (*Philippine Jour. Sci., B. Med. Sci., 4 (1909), No. 4, pp. 289–299, pls. 3*).—In this article, which summarizes reports undertaken as a part of a medical survey of Taytay, some of which have been referred to above, data are included regarding the food habits and other living conditions.

The chemical regulation of the processes of the body by means of activators, kinases, and hormones, W. H. Howell (*Science, n. ser., 31 (1910), No. 786, pp. 93–100*).—In this address, delivered at the Boston meeting of the American Association for the Advancement of Science, December, 1909, the chemical regulation of digestive processes and other processes in the animal body is discussed, and some of the newer theories which have to do with these topics are considered.

The osmotic pressure of liquid foods, J. L. Jona (*Bio-Chem. Jour., 4 (1909), No. 10, pp. 462–466*).—Coffee, tea, alcoholic beverages, lemon juice, diluted molasses, soups, beef tea, sugar solutions, fruit juices, proprietary foods, and saline aperient solutions were used in the experiments reported.

Quotations from the author's general conclusions follow:

"Of all the fluid foods which are admitted to the stomach, alcoholic beverages and fruit juices alone are hypertonic. Further, it may be safely stated that in no case is a fluid admitted in which hypertonicity is due to the mineral ingredients alone. When, therefore, we find the kidney elaborating a fluid (urine) with sufficient saline ingredients to render it hypertonic, we must regard the high concentration of this fluid as so much external work done and of sufficient moment to be taken into consideration in calorimetric experiments on an animal or on the human subject. These experiments also demonstrate that we must ascribe to the sense of taste a distinct osmotactic character. Not only is this sense potent in testing the food qualitatively, but also from the quantitative standpoint of molecular concentration. Even those hypertonic fruit juices which are admitted to the stomach are passed, so to say, under protest, for their taste is recognized as astringent or highly acid, and are apt to be followed by a sense of thirst. . . .

"The great majority of fluid foods are, however, hypotonic, and thus a margin is left for the addition of hydrochloric acid and other constituents of the gastric juice. . . .

"The association of the raising of osmotic pressure of beverages with the induction of thirst is made use of in some departments of commerce by the excessive salting of wines and the oversugaring of 'summer drinks.' In the case of cane sugar, a solution isosmotic with the blood would be about 11 per cent, whereas the fluid which reaches the stomach as a result of even the slow methods of ingestion of sweetmeats, as exemplified in the process of sucking confectionery, is much higher than this, and accounts for the disagreeable after-results very often experienced after overindulgence in such delicacies."

The partial transformation of food fat into mannites by peptic and pancreatic digestion in vitro, É. GAUTRELET (*Compt. Rend. Acad. Sci. [Paris], 149 (1909), No. 24, pp. 1150, 1151*).—From his experiments the author concludes that in both sorts of artificial digestion mannites were formed from fat.

On the nature of the so-called fat of tissues and organs, H. MACLEAN and O. T. WILLIAMS (*Bio-Chem. Jour., 4 (1909), No. 10, pp. 455–461*).—The high saponification number of the fat obtained, by thorough extraction with alcohol and ether, from the blood, organs, and tissue of dogs showed that the material could not be composed to any extent of ordinary fat. According to the authors, "the high saponification values were found to be caused by combination of part of the sodium with phosphoric acid and glycero-phosphoric acid liberated during the process of saponification.

"Every organ and tissue naturally contains more or less neutral fat in the interstices of its substance; but though it would seem that the preponderating portion of the 'fat' combined with protein in the bioplasm as masked fat is present as phosphatid, in addition some of the phosphatid is present in free form, perhaps as a phase in its passage to combination; free phosphatids would, on this view, constitute preliminary substances which subsequently pass on to actual combination in the tissues. In a normal organ, therefore, the less microscopical evidence there is of fat, the less neutral fat is actually present; while the combined fat—a phosphatid—seems to represent one of those steps in that synthetical elaboration of fats which appears to be a necessary prelude to actual assimilation. It is not improbable that phosphatids represent a necessary step in the elaboration of fatty substances destined ultimately to undergo actual assimilation into living matter. That such substances are essential for the vital processes seems indicated by their presence in all living cells hitherto investigated; it can not be doubted that one of the steps which ordinary fat undergoes in the cell is a transformation into phosphatid, and probably in these bodies the desaturation of the fatty acid radicle is brought about. Whether this elaboration is necessary for the ultimate oxidation of all fats, or whether we have here wholly or in part a process somewhat analogous to the endogenous metabolism of protein, can as yet be but conjecture. The fact, however, that phosphatids contain practically all the constituents . . . of nucleo-proteins, is not without significance, and it is not unlikely . . . that they may be the source of the cell nucleoproteins."

Experiments on the amount and character of fat in pig liver were also briefly reported. From the data obtained the author concludes that apparently "the essential fat of the liver, and probably of certain other organs, is really phosphatid, and under certain circumstances, if care be taken to avoid disintegration during the process of extraction, it may be practically the only one found in any appreciable amount in the combined part of the 'fat.'"

Concerning the partition of nitrogen in the urine of infants, H. VOGT (*Monatsschr. Kinderheilk., 8 (1909), No. 2–3; abs. in Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. ser., 4 (1909), No. 19, p. 761*).—The author concludes that in the case of healthy infants, as with adults, the partition of nitrogen in the urine is rather constant, provided there are no abnormalities in the composition of the food. His other conclusions have to do with pathological conditions.

ANIMAL PRODUCTION.

Forage plants of Uruguay and their value as feeding stuffs for cattle, J. SCHROEDER (*Rev. Secc. Agron. Univ. Montevideo, 1907, No. 2, pp. 86–103; 1908, No. 3, pp. 119–141*).—Analyses of alfalfa, clovers, grasses, and other forage plants of Uruguay are reported and their value for feeding purposes discussed.

Composition of Indian feeding stuffs, M. Greshoff (*Bul. Kolon. Mus. Haarlem, 1909, No. 42,* [*p. 261*], *folio*).—Analyses of wheat, oats, rye, lupines, and other feeding stuffs of the Dutch East Indies are reported.

Desiccation of potatoes, T. H. Norton (*Daily Cons. and Trade Rpts.* [*U. S.*], *1910, No. 3716, pp. 1–3*).—An account is given of a new process used in Germany for drying potatoes and making them into a meal to be used for a feeding stuff. The plant required for the treatment of 10,000 tons of potatoes during a season of about 8 months cost from $18,000 to $19,000. The total cost of preparing unpressed potato meal by this method is about 56 cts. per long ton of tubers, and the additional cost for pressing into cakes is 12 cts. per ton. About 3.8 tons of raw potatoes yield 1 ton of the desiccated product.

Concerning feeding rice, W. R. Dodson (*La. Planter, 44* (*1910*), *No. 6, p. 92*).—A discussion of the value of rice as a feeding stuff. The author estimates that 1 lb. of rice without the hulls is worth about as much as 1⅙ lbs. of corn. Under favorable conditions it is thought that rice ought to return about $2 a barrel when fed to steers.

Silos and silage (*Dept. Agr. N. S. Wales, Farmers' Bul. 6, pp. 79, pls. 3, figs. 76*).—A bulletin of practical information on the construction of tub, hillside, and pit silos and on the cultivation and harvesting of ensilage crops adapted to Australian conditions. Directions are also given for making stack silage.

Commercial feeding stuffs, E. H. Jenkins and J. P. Street (*Connecticut State Sta. Rpt. 1909–10, pt. 3, pp. 281–322*).—This report contains an interpretation of the state feeding stuffs law and reports analyses of over 200 samples of feeds which include cotton-seed and linseed meals, wheat, maize, rye, barley, and buckwheat by-products, distillers' and brewers' grains, and many proprietary and condimental feeds.

Report of commercial feed stuffs, J. E. Halligan (*Louisiana Stas. Feed Stuffs Rpt. 1908–9, pp. 198*).—Analyses are reported of 10,672 samples of cotton-seed meal, cotton-seed feed, wheat and rice by-products, corn chop, hominy feeds, brewers' grains, alfalfa meal, and molasses and other mixed feeds.

The inspection and analysis of commercial feeding stuffs (*Mississippi Sta. Bul. 125, pp. 3–27*).—Analyses are reported of about 500 samples of corn chop, wheat and rice by-products, red dog flour, and molasses and other mixed feeds.

[Feeding stuffs analyses], T. E. Keitt (*South Carolina Sta. Rpt. 1909, pp. 24, 25*).—Analyses are reported of cotton-seed meal, wheat bran, mixed bran, corn meal, and corn silage.

Feeding stuffs inspection: Concerning commercial feeding stuffs, J. L. Hills, C. H. Jones, and P. A. Benedict (*Vermont Sta. Bul. 144, pp. 3–48*).—This bulletin discusses in a general way the composition of feeds and the formulation of grain rations. Analyses are also reported of cotton-seed, linseed, and alfalfa meals, red dog flour, cotton-seed, gluten, corn, oat, flax and molasses feeds, distillers' and brewers' grains, and proprietary and mixed feeds.

"Certain feeds while meeting guaranties are deemed to be ill-advised purchases for the reasons stated:

"Molasses feeds as a class; because of the likelihood that living weed seeds are used; because of the inferior nature of the absorbents used; because at ruling prices the digestible nutrients are relatively costly.

"Flax feeds; because of the presence of weed seeds, either ground or unground; because of unknown feeding values; and because poisonous seeds may occur therein.

"Cotton-seed feeds; because it is unnecessary to import cotton-seed hulls which have a low food value.

"Oat feeds; because of the low feeding value of the extraneous oat hulls with which they all are more or less laden.

"Alfalfa meals; because the payment of a concentrate price for hay even though it be ground is absurd."

Experimental evidence on the effectiveness of selection, H. S. JENNINGS (*Amer. Nat., 44 (1910), No. 519, pp. 136–145*).—A paper, read before the American Society of Naturalists December 29, 1909, which gives a discussion of the significance of pure lines (E. S. R., 21, pp. 469, 771) in the evolution of types. The author suggests that Johannsen's term "genotype" be substituted for "pure line," and defines genotype as "a set of individuals which so long as they are interbred produce progeny that are characteristically uniform in their hereditary features, not systematically splitting into diverse groups." It is pointed out that Galton's law of ancestral inheritance does not hold in pure lines, even in a statistical sense, and that investigators who have brought about changes in type by selection have not worked with genotypes.

"What the pure line work shows (agreeing in this with other lines of evidence) is that the changes on which selection may act are few and far between, instead of abundant; that they are found not oftener than in one individual in ten thousand, instead of being exhibited on comparing any two specimens; that a large share of the differences between individuals are not of significance for selection or evolution—these being precisely the differences measured as a rule by the biometrician's 'coefficient of variation.' . . . The work with genotypes brings out as never before the minuteness of the hereditary differences that separate the various lines. These differences are the smallest that can possibly be detected by refined measurements taken in connection with statistical treatment. . . . The genotypic work lends no support to the idea that evolution occurs by large steps, for it reveals a continuous series of the minutest differences between great numbers of existing races. . . .

"Altogether, I think we may say that the pure line or genotype concept presents an instrument of analysis which is worthy, on the basis of what it has thus far done, of a thorough tryout for future work, and no one interested in these questions can afford to neglect it."

The imperfection of dominance and some of its consequences, C. B. DAVENPORT (*Amer. Nat., 44 (1910), No. 519, pp. 129–135*).—A paper, read before the American Society of Naturalists December 29, 1909, in which the author cites several examples of imperfect dominance, of which there are all degrees, and explains them on the hypothesis that a determiner, though present, may fail to complete its ontogeny, or, in other words, that the dominance is not reversed but merely weakened. The determiner may be so weak that the character may fail completely in a development of the heterozygote, and even in a homozygote will give the impression of noninheritability.

"By the aid of the facts of imperfection in dominance and the hypothesis of varying potency of determiners the territory to which the principle of the segregation of determiners is applicable becomes greatly extended."

On a new method of determining correlation between a measured character A, and a character B, of which only the percentage of cases wherein B exceeds (or falls short of) a given intensity is recorded for each grade of A, K. PEARSON (*Biometrika, 7 (1909), No. 1–2, pp. 96–105*).—A new and rapid method of determining correlation when one variable is given quantitatively and the other is divided into two classes only is presented. Hitherto such prob-

lems could only be treated by the fourfold table method, which led to diverse results according to the arbitrary placing of the division. Several examples of the method are given.

A mechanism for organic correlation, G. H. PARKER (*Amer. Nat., 43 (1909), No. 508, pp. 212–218*).—The author cites examples to show that many organs of the body produce hormones that affect the form or structure of other organs, external as well as internal. "Shattock and Seligmann have shown [that when] a small piece of a male gland is grafted into a young castrated male, the comb, hackles, and spurs may develop as in a normal bird. It is, therefore, highly probable that the reproductive glands, like the ductless glands, produce hormones by which the development of the secondary sexual organs is determined."

The author thinks that the hormones of the internal environment of an organism are mechanisms of correlation and that by means of them one organ influences another. He points out that in nature selection may well be conceived to modify an internal hormone-producing organ if this organ is of vital significance, and incidentally to establish a new internal environment that would so influence the form and external configuration of a given organism that it would be called a new species, even though none of the new external features by which this organism would be described might show the least usefulness.

The relation between fertility and normality in rats, R. E. LLOYD (*Rec. Indian Mus., 3 (1909), No. 3, pp. 261–265*).—The weight of 1,000 female house rats of India ranged from 50 to 210 gm. Correlation tables are presented which do not show any correlation between size and fertility. The mode, or the number of young in a litter occurring with the greatest frequency, was five.

The significance of the "chestnuts" on the legs of solid-hoofed mammals, R. HINTZE (*Zool. Anz., 35 (1910), No. 12–13, pp. 372–380*).—The author suggests that the growths, commonly called chestnuts, which occur on the legs of the horse and its allies, may have had their origin as the horny pads or cushions of a plantigrade ancestor which became vestigial when the animal acquired the habit of walking on its toes.

Anatomical-histological investigations on the "shield" of male swine in regard to meat inspection, G. STEMMER (*Anatomisch-histologische Untersuchungen über den Schild der Männlichen Suiden mit Berücksichtigung der Fleischbeschau. Inaug. Diss., Univ. Bern, 1909, pp. 51, pls. 3, figs. 3*).—From a study of a large number of animals the author concludes that the thickening of the dermis which occurs on the shoulder, commonly called the shield, is a secondary sex characteristic of males. It is a post-embryonic structure not known in any other animal and consists chiefly of connective tissue. According to the German feeding stuff law it is not a human food and should be removed from the slaughtered animal before stamping, although some butchers are known to grind it up for sausage.

The effect of castration on the metabolism, F. H. MCCRUDDEN (*Jour. Biol. Chem., 7 (1910), No. 3, pp. 185–197*).—A brief review by the author of the literature on this subject does not show that there is any definite knowledge concerning the effect of the removal of the testes and ovaries on metabolism, although the general opinion is that there is at least a temporary change.

The author also reports an experiment of his own in which 2 male and female dogs were desexed and fed a ration of lean beef heart, lard, cracker dust, and water. The results do not confirm the view generally held that castration is followed by a retention of material, especially the mineral elements, the general tendency being in the other direction. In almost every instance where there

was a retention of material before castration this retention was either decreased or became a loss after castration.

Castration and its effect on animal organism, J. H. W. T. REIMERS (*Cultura, 21* (*1909*), *No. 256, pp. 656–665*).—A summary of investigations on this topic.

A contribution to the study of bleeding with different methods of slaughtering, B. HOTH (*Ein Beitrag zur Lehre der Ausblutung bei Verschiedenen Schlachtmethoden. Inaug. Diss., Univ. Bern, 1908, pp. 35*).—The author reviews the literature on the subject and reports experiments involving 176 animals, in which, by different methods of slaughtering he obtained the following percentages of the live weights of blood discharged: With oxen, by the Jewish method 3.6, by bleeding after stunning with a hammer 3.61, by the use of the striking mask followed by pithing (mutilation of the medulla oblongata) 3.35, and by the Stoff shooting apparatus 3.24; with cows, Jewish method 4.07, stunning with hammer 4.18, pithing 3.59, and shooting apparatus 3.39; with bulls, Jewish method 3.56, stunning with hammer 3.85, pithing 3.28, and shooting apparatus 3.24; with calves, Jewish method 6.03, and cervical cutting after clubbing 5.86; with sheep, Jewish method 4.45, cutting carotids without stunning 4.5, and cutting carotids after stunning with hammer 4.43; with sows, sticking in the chest after stunning with hammer 3.1; and with castrated boars, sticking in chest after stunning with hammer 2.8 per cent.

The conclusion is drawn that from a hygienic standpoint, methods which do not injure the medulla oblongata are to be preferred because the latter method prevents a complete discharge of the blood. In cattle and swine females discharged more blood in proportion to their weight than males, and calves have proportionally more blood than mature cattle of either sex.

What is the average loss in slaughtering Westphalian pure bred swine and what are the controlling factors? W. ESTOR (*Wie Hoch Stellt sich der Durchschnittliche Schlachtverlust beim Westfälischen Veredelten Landschwein und Welche Momente Beeinflussen Ihn? Inaug. Diss., Univ. Bern, 1908, pp. 32, chart 1*).—Slaughter tests by the author show that the percentage of weight lost in slaughtering swine ranged from 13.7 to 32.5, the average being 19.43. The factors which affect the results were found to be breed, sex, time since the last feeding, time of the year, and the nature of the food during the period of finishing. The loss was less in cold than in warm weather, and also less when the finishing was on a ration rich in protein than on a ration consisting largely of potatoes.

Short fed steers: A comparison of methods of feeding, H. W. MUMFORD and H. O. ALLISON (*Illinois Sta. Bul. 142, pp. 565–578, figs. 5*).—In this experiment 34 grass-fed 3-year old steers averaging 1,073 lbs. in weight were divided into 2 lots of 17 each and fed for 89 days on a ration of corn meal, oil meal, and clover hay. Lot 1 was fed twice each day as is the common practice, whereas with lot 2 the clover hay was cut and mixed with the grain ration and fed through a self-feeder to which the cattle had access at all times.

The average daily gains per head were 2.984 lbs. and 3.326 lbs., respectively, at a cost per pound of gain of 7.53 cts. and 7.49 cts., respectively. If the value of the pork produced by the hogs kept in the pasture to utilize the waste is considered, the cost of gains for the 2 lots is reduced to 7.39 and 7.11 cts., respectively. The feeds were rated as follows: Ground corn $13.70, clover hay $8, ground clover hay $9, and oil meal $28 per ton. When sent to market lot 1 was estimated at $5.45 per hundred and lot 2, $5.60 per hundred.

"In general the financial results of this experiment were favorable to the method of feeding used for lot 2. While the data given in this publication are

not extensive they indicate that for short feeding cattle the plan of chaffing hay, mingling it with grain, and feeding through a self-feeder is worthy of further investigation and trial by feeders."

"Under the conditions of the experiment, the profit to be derived from short feeding cattle was 7.36 per cent interest on the total expenditure for 90 days for lot 1 and 18.88 per cent for lot 2. With expenses as figured the necessary margin per hundredweight between buying and selling price in Chicago in order to break even was $1.137 for lot 1 (common method of feeding) and $1.166 for lot 2 (chopped hay and self-feeder), when the pork produced is not considered. . . . The larger gain of lot 2 resulted in better finish, 15 cts. per hundredweight higher selling price, and $2.05 per steer more profit (not including pigs) than lot 1."

Cattle breeding in German colonies, A. R. Erlbeck (*Milch Ztg., 39 (1910), No. 5, pp. 49–52*).—A general and statistical account of cattle breeding in the German colonies in Africa and the East Indies.

Cattle of southern India, W. D. Gunn (*Dept. Agr. Madras Bul. 60, pp. 65, pls. 68, map 1*).—An account of methods of cattle raising as practiced in southern India, including feeding, breeding, and religious ceremonies connected with the cattle industry. The principal breeds of cattle and domesticated buffaloes of the Madras Presidency are illustrated and described.

The cattle of southern India, W. D. Gunn (*Philippine Agr. Rev. [English Ed.], 2 (1909), No. 12, pp. 685–702, map 1*).—Extracts from the work noted above.

The determination of the age of calves, A. Schultze (*Die Altersbestimmung bei Kälbern. Inaug. Diss., Univ. Bern, 1909, pp. 52, pls. 3*).—The author reviews the literature on this subject and describes in detail the condition of the teeth, gums, navel, hoofs, and undeveloped horns in 149 calves. These characters vary so much that no one character is a reliable guide, but it is thought that, taken collectively, one can estimate by means of them the age of the calf with a reasonable degree of accuracy.

Farmers' sheep, R. W. Peacock (*Dept. Agr. N. S. Wales, Farmers' Bul. 1, pp. 46, figs. 31*).—This gives data for the practical farmer, for the most part previously noted from other sources.

Suggestions for pig feeders (*Jour. Bd. Agr. [London], 16 (1909), No. 9, pp. 718–731; 16 (1910), No. 10, pp. 820–831*).—This is a summary of information of value from a practical standpoint and includes the results of numerous experiments in feeding swine which have been made in Europe and America.

The brood sow and her litter, F. G. King (*Missouri Bd. Agr. Mo. Bul., 7 (1909), No. 10, pp. 26*).—This is a bulletin of practical information based upon experiments that have been made at the different experiment stations and the practice of the leading breeders and farmers of Missouri.

Relative efficiency of different rations for fleshing horses for market, R. C. Obrecht (*Illinois Sta. Bul. 141, pp. 525–562, figs. 11*).—The plan of the first experiment reported was to compare corn with a mixed ration of corn and oats, and clover hay with timothy hay as rations for fleshing horses for market in an 84-day period. If the preliminary feeding period had been included the entire period would have almost equaled the usual time (100 to 120 days) required to put thin horses into marketable condition.

Five mares and 13 geldings from 4 to 7 years of age, weighing about 1,400 lbs., were used for this experiment. The feeds were rated as follows: Corn 35 cts. per bushel, oats 30 cts. per bushel, bran $20 per ton, old process oil

meal $27 per ton, clover hay $8 per ton, and timothy hay $9 per ton. The results are summarized in the following table:

Effect of different rations in fleshing 17 horses during a period of 84 days.

	Ration.	Dry matter fed daily per 1,000 lbs. live weight.	Daily gain in weight per head.	Cost per pound gain.	Estimated increase in value per head.
		Lbs.	*Lbs.*	*Cents.*	*Dollars.*
Lot 1	Corn, bran, oil meal, clover	20.6	2.29	8.5	51.00
Lot 2	Corn and oats 1:1 bran, oil meal, clover.	19.75	2.98	7.4	48.75
Lot 3	Corn and oats 1:1 bran, oil meal, timothy hay.	21.48	1.88	12.1	35.00

The second experiment was planned to secure more data on the results of mixing oats with bran and corn, as compared with an all-corn ration with clover hay as the roughage. Comparison was also made as to the effect of exercise and no exercise with the taking on of flesh. The feeds were rated as follows: Corn 43 cts. per bushel, oats 35 cts. per bushel, bran $20 per ton, oil meal $27 per ton, and clover hay $13 per ton. The results of the feeding trial are summarized in the following table:

Effect of different rations in feeding 20 horses during a period of 112 days.

	Ration.	Dry matter fed daily per 1,000 lbs. live weight.	Daily gain in weight per head.	Cost per pound gain.	Estimated increase in value.
		Lbs.	*Lbs.*	*Cents.*	*Dollars.*
Lot 1	Corn, oil meal, clover hay	19.96	2.12	12.0	44.00
Lot 2	Corn and oats 3:1, oil meal, clover	20.91	2.38	12.3	51.00
Lot 3	Corn and oats 1:1, oil meal, clover	21.07	2.44	12.7	42.00
Lot 4	Corn and bran 4:1, oil meal, clover	20.42	2.26	12.4	48.00

The following conclusions were among those drawn:

"A mixed grain ration of corn and oats, when fed with clover hay, is more efficient than a single grain ration of corn for producing large gains in an 84-day feeding period.

"While a ration of corn, oats, and clover hay is more expensive with prices of feeds as stated, than one of corn and clover hay, the gains are such as to make its use more economical.

"Clover hay when fed with a mixed grain ration of corn and oats is more efficient for producing gains than timothy hay. In this test clover hay produced 58 per cent more gains than timothy.

"A ration of corn, oats and timothy is not satisfactory for producing finish in fleshing horses for market, but may be materially improved by the addition of oil meal. . . .

"A ration of one-fourth oats and three-fourths corn proved more economical than one of half oats and half corn.

"A ration of corn and bran fed in proportions of one part bran to four parts corn by weight is superior to an all-corn ration for producing gains when fed in conjunction with clover hay.

"This test seemed to indicate that there is danger of feeding too much bran for best results when clover hay furnishes the roughage part of the ration. The bran and clover combined produced a too laxative condition. . . .

"Exercise has a retarding effect upon the taking on of flesh. In this test the horses receiving no exercise made 24 per cent more gains than those having a daily walk of 2.8 miles.

"While box stalls are safer than single stalls for stabling horses, they are also more expensive and do not offer merits not possessed by single stalls so far as they may influence the horse in taking on flesh. The horses stabled in single stalls made 16 lbs. or 8 per cent more gains in 84 days than those in box stalls."

Suggestions for the improvement of Wisconsin horses, A. S. ALEXANDER (*Wisconsin Sta. Bul. 186, pp. 3–30, figs. 9*).—This bulletin reports statistics of the Wisconsin horse industry and offers suggestions for improving the breeding stock by the elimination of unsound animals and using more pure-bred sires. "During the past 3 years the horses of the State have increased 66,068 head in numbers and $16,216,852 in total value. In 1906 the average value of each horse in the State was $91.65. On January 1, 1909, the value was $107, or an increase of $15.35 per head." The increase in value per head is thought to be due in part to the influence of the stallion law, which is discussed in detail.

Wisconsin horse breeding statistics, A. S. ALEXANDER (*Wisconsin Sta. Bul. 188, pp. 3–54*).—This bulletin gives an account of the operation of the state stallion law during the fourth breeding season since the law went into effect. It also contains the amendments to the law in 1909, a résumé of stallion legislation in other States, a directory of owners of licensed stallions and jacks, and a list of transfers during 1909.

The Kellerstrass way of raising poultry, E. KELLERSTRASS (*Kansas City, Mo., 1909, pp. 45, figs. 22; rev. in Farm Poultry, 21 (1910), No. 4, pp. 20, 21*).—A book of practical information, being chiefly an account of the methods practiced on the farm of the author.

DAIRY FARMING—DAIRYING.

Shall the dairyman buy concentrates? W. J. SPILLMAN (*Hoard's Dairyman, 41 (1910), Nos. 4, pp. 123, 124; 10, pp. 376–378*).—The author submits data which are based on cattle records obtained from dairy farms by the Farm Management Investigation of this Department and indicate that on a dairy farm under present conditions larger returns can be obtained by feeding home-grown grains than when concentrates are purchased, even though a smaller number of cows is kept.

[Dairy rations], D. O. NOURSE (*South Carolina Sta. Rpt. 1908, pp. 26–29*).—This is a discussion of rations for dairy cattle in the Southern States based on experimental data. Corn silage and cotton-seed meal was found to be the most economical feed for South Carolina. Cotton-seed meal given at the rate of 6 lbs. per day caused no apparent ills after having been fed for 3 years.

The effect of milk as a nutrient for dairy animals, C. BEGER (*Landw. Vers. Stat., 71 (1909), No. 4–5, pp. 353–372; abs. in Milchw. Zentbl., 6 (1910), No. 1, pp. 18, 19*).—In experiments with 2 goats the average daily yield of milk for each animal was 1,151.8 gm. with whole milk as a supplementary ration, 1,225.7 gm. with tropon, sugar, and milk fat, and 862.7 gm. with skim milk and milk fat. After making corrections for the occurrence of some of the feeding periods at a late stage of lactation, the author concludes that fat as

an emulsion in the form of whole milk was superior to nonemulsified fats, which accords with his experience as previously noted (E. S. R., 19, p. 470).

The university dairy herd, 1908–9, G. C. Humphrey and F. W. Woll (*Wisconsin Sta. Bul. 187, pp. 3–22, figs. 3*).—This bulletin presents data relating to the feed consumed and milk produced by the station herd during the year ending May 11, 1909.

The results obtained with the individual cows are discussed with reference to the value of the rations fed for milk production. Twenty-five cows averaged during the year 8,439.6 lbs. of milk and 363.62 lbs. of butter fat. If an average of the actual prices received for butter fat and the prices paid for feed be taken, the average value of their product would be $111.76, the cost of feed eaten $50.34, and the average net profit $61.42. The winter grain ration used consisted of wheat bran, corn meal, and distillers' grains in the proportion of 3:4:3. Small amounts of oats, oil meal, and brewers' grains were fed occasionally when the cows needed variety.

The feeding shows that cows which are high producers can consume large amounts of dry matter containing as high as 2½ lbs. of digestible protein daily and use their feed economically, while cows that are advanced in lactation and are low producers must feed less grain and cheaper feeds if they are to yield any profit. The 7 cows in the herd which produced more than 1½ lbs. of butter fat per day during the winter period consumed on the average 17 lbs. of dry matter and 1.62 lbs. of digestible protein for each pound of butter fat produced. The 9 cows which made less than ¾ lb. of butter fat per day consumed on the average 30.9 lbs. of dry matter and 2.33 lbs. of digestible protein per pound of butter fat produced.

The average production and net profit of the herd during the last 6 years, as estimated on the basis of 27 cows which produce an average of 7,454 lbs. of milk containing 315.7 lbs. of butter fat, was $85.49 as a value of total products less $37.70 total cost of feed, leaving a net profit of $47.79 per cow per year. The net profit returned last year was the highest since the herd was established 11 years ago.

The chemical composition of milk, J. de Brévans (*Hyg. Viande et Lait, 3 (1909), No. 12, pp. 593–618*).—A summary and discussion of variability in the chemical composition of milk. Tables of analyses are given to show the variations due to individuality, breed, period of lactation, and other factors.

On the formation of milk sugar, C. Porcher (*Biochem. Ztschr., 23 (1910), No. 5, pp. 370–401, figs. 12*).—The removal of the mammary glands of goats and cows, either before or after parturition, induced glucosuria and was accompanied by hyperglucohemia. Injections of phlorizin in lactating animals produced glucosuria. From these experiments it is thought that lactose is formed from glucose in the blood as it circulates through the mammary gland, and that on the removal of the gland this glucose is excreted in the urine.

Further investigations on the influence of stimulating substances on milk secretion, G. Fingerling (*Landw. Vers. Stat., 71 (1909), No. 4–5, pp. 373–414*).—A continuation of work previously reported (E. S. R., 19, p. 778). Fennel, malt sprouts, coconut cake, and palm-nut cake, which are rich in stimulating substances, were contrasted with starch, peanut oil, and other feeds which have no stimulating effect. The basal ration was hay, from which the aromatic and stimulating material had been removed by steeping. Two new milch goats were used and the feeding periods lasted 15 days each.

The author concluded that of the feeds tested malt sprouts, palm-nut cake, and coconut cake contain substances which exercise a stimulating effect on the mammary glands independent of the form of digestible nutrients contained in the feeding stuff. In the case of one goat the average daily yield of milk on

the various rations was: 715 gm. on malt sprouts, 718 gm. on palm-nut cake, 708 gm. on coconut cake, 672 gm. on fennel; 518 gm. with feeds not containing a stimulating substance, and 736 gm. with normal hay and with palm-nut cake. Corresponding results with the other goat were, on malt sprouts 662 gm., palm-nut cake 651 gm., coconut cake 598 gm., fennel 662 gm., without stimulating feed 502 gm., and with normal hay and coconut cake 554 gm. Digestion coefficients, analyses of feeding stuffs, and other data are given.

The so-called iron milk, C. Mai (*Ztschr. Untersuch. Nahr. u. Genussmtl., 19 (1910), No. 1, pp. 21-23*).—An experiment is reported in which 2 cows received a ration composed in part of a proprietary feed which contained a large percentage of iron. The claim that this feed would raise the percentage of iron in the milk was not sustained by the experiment.

Experimental leucocytosis in the cow's udder, C. Hoffmann (*Wisconsin Sta. Research Bul. 6, pp. 207-218, figs. 2*).—This reports a study of the effect of injections into the udder of various solutions injected at blood heat upon the leucocyte content of cow's milk. The usual method was to inject 2 quarters of the udder with from 150 to 300 cc. of the solutions, introducing them into the udder by means of a milking tube connected with a large separatory funnel, so graduated that the amounts introduced into the udder could be accurately determined. No pressure was applied, injection depending entirely upon the action of gravity. The leucocyte determinations were made according to the modified Doane-Buckley method.

Injections of the sterile solutions were made about 6 hours after the morning milking had been completed, or about 11 a. m., and the cow was again milked at 4 p. m. Even in so short a time marked changes invariably occurred in the texture and appearance of the udder. Inflammation characterized by swelling and fever could usually be detected. The number of leucocytes increased greatly in those quarters into which the sterile, distilled water was introduced. The maximum number of leucocytes was found in the second and third milking, 18 to 30 hours after the injection. The number of leucocytes, however, then rapidly decreased until by the third day the milk could again be considered normal. Injections of a 2 per cent solution of boric acid produced leucocytosis, but not nearly so marked as with the sterile, distilled water, while with a 0.6 per cent solution of sodium chlorid the leucocyte content remained about the same as with the water.

After an injection of 0.5 cc. of a broth culture of *Bacillus prodigiosus* in 100 cc. of sterile water, or 1 cc. of the culture in 200 cc. of water, the milk secretion was practically stopped. There was a marked inflammation of the entire udder and a general constitutional illness. Recovery was rapid, and by the third milking it was possible to obtain a few streams of a watery, yellowish clotted liquid from the injected quarters, but the milk was so abnormal that no determinations of leucocytes could be made until the eighth milking. It was considered doubtful whether the organism alone was the cause.

A repetition of these experiments with another cow gave similar results. An increased leucocyte content was often accompanied by a decrease in bacteria. In the uninjected quarters the leucocyte content was unchanged and also the bacterial content. The authors suggest that the decrease in number of bacteria may have been due to the phagocytic action of the leucocytes. A microscopical examination of the sediment from the milk of the injected quarters showed many leucocytes containing from 5 to 25 bacteria, while the sediment from the uninjected quarters showed no such action. In the abnormal milk the presence of flocculent material was also noted. Examinations of these clots, which were of a doughy consistency and invariably rose to the surface of the liquid, revealed them to be comprised almost entirely of large masses of fibrin strands.

"From the standpoint of milks which show an abnormally high leucocyte content this relation of fibrin to leucocytes is of importance, for it enables one to determine whether the leucocytosis is normal or due to an inflammatory condition. Previous studies have shown that those milks which are high in leucocytes but which come from perfectly normal cows do not as a rule contain fibrin."

Before injection the acidity of the milk was practically the same in all quarters, but subsequently thereto considerable differences were found. In most cases the milk from the uninjected quarters showed more acidity than that from the injected. This was true only immediately subsequent to injection and gradually disappeared.

The sensitiveness of the mammary gland to foreign substances is emphasized by these results.

The significance of leucocytes in milk, W. G. SAVAGE (*Jour. Roy. Inst. Pub. Health, 18 (1910), No. 2, pp. 65–71*).—A summary of work on this subject.

In the opinion of the author a differential enumeration of leucocytes is of great value. "Rigid standards as to the number of leucocytes to allow in milk can not be set up, but the count indicates the need for local investigation. With extended experience it may do much more than this. The enumeration can be rapidly performed. It gives definite information which inspection frequently can not furnish, and the procedure reaches its highest utility when combined with a bacteriological examination of the milk."

A bibliography of the literature is appended.

Bacterial content of the milk of individual animals, E. G. HASTINGS and C. HOFFMANN (*Wisconsin Sta. Research Bul. 6, pp. 189–196; Centbl. Bakt.* [etc.], *2. Abt., 25 (1909), No. 19–25, pp. 465–470*).—A report on the bacterial and leucocytic content of cow's milk.

Two animals were found which had large numbers of bacteria and also an abnormally large leucocyte content. The authors think it possible that at some previous time the cows may have had an attack of garget caused by pyogenic bacteria and that the organisms persisted after recovery, becoming carriers of bacteria as in the case of human beings which carry typhoid.

The occurrence and distribution of a lactic acid organism resembling Bacillus bulgaricus of yoghourt, E. G. HASTINGS and B. W. HAMMER (*Wisconsin Sta. Research Bul. 6, pp. 197–206; Centbl. Bakt.* [etc.], *2. Abt., 25 (1909), No. 14–18, pp. 419–426*).—A continuation of work previously noted (E. S. R., 20, p. 573).

For 2 years many samples of milk from different sources have been incubated at 37° and in all cases developed a greater acidity than could be accounted for by the presence of *B. lactis acidi*, indicating that the causal organism, a bacillus closely related to *B. bulgaricus* and to *B. casei* ε, has a wide distribution.

Milk and its relation to the public health (*Pub. Health and Mar. Hosp. Serv. U. S., Hyg. Lab. Bul. 56, pp. 834, pls. 51, figs. 67*).—A new and revised edition of work previously noted (E. S. R., 19, p. 1175). Besides numerous revisions, the additional chapters found in this edition are: The Relation of the Tuberculous Cow to Public Health, by E. C. Schroeder; The Thermal Death Points of Pathogenic Micro-organisms in Milk, by M. J. Rosenau; The Relative Proportion of Bacteria in Top Milk (Cream Layer) and Buttermilk (Skim Milk) and Its Bearing on Infant Feeding, by J. F. Anderson; and National Inspection of Milk, by H. W. Wiley. New material has also been added to the topics of bacillus carriers, bacteriological standards of the American Association of Medical Milk Commissions, and on the detection and prevention of milk epidemics.

The organization of the milk supply, J. N. HARRIS (*Jour. Bd. Agr. [London], 16 (1910), No. 10, pp. 810–820*).—An account of several successful cooperative dairy societies in Great Britain which have been organized in recent years. By cooperation the producers have received an increased price for their milk. It is pointed out that these organizations are also of benefit to the consumer, as it is easier to improve the sanitary conditions under which the milk is produced and distributed.

The provision of milk for cities, RIEVEL, trans. by L. M. STECKEL (*Amer. Vet. Rev., 36 (1910), No. 5, pp. 561–568*).—This is a translation of a report made to the Ninth International Veterinary Congress on the importance of having the State regulate the milk trade, and contains many suggestions concerning milk inspection.

Pasteurization of milk, R. G. FREEMAN (*Jour. Amer. Med. Assoc., 54 (1910), No. 5, pp. 372, 373*).—The dangers in using raw market milk and commercial pasteurized milk are pointed out.

"The only safety for the consumer is to get his milk sweet and raw. Having obtained it he should then render it safe by the use of the smallest amount of heat compatible with safety. A temperature of 140° F., but little higher than the temperature in which one can bear one's hand, if continued for 40 minutes, with the milk in a closed nursing bottle, is sufficient to kill all the bacteria that we know and fear in milk, at the same time changing neither the taste nor, so far as we know, the chemical composition or the ferments of the milk. . . . Pasteurized milk does not cause malnutrition or scurvy or rachitis."

To what extent is there danger in using milk and milk products from cows which have tuberculosis of the udder? A. WEBER (*Tuberkulose Arb. K. Gsndhtsamt., 1910, No. 10, pp. 1–100*).—This is an investigation of the prevalence of tuberculosis in human beings who use milk obtained from cows known to have mammary tuberculosis. So few cases were found where it could be positively proved that tubercular lesions were caused by the use of such milk that the author thinks the danger of contracting the disease from such a source is comparatively slight as compared with contracting it from human beings who have tuberculosis of the lungs.

Milk defects and their relation to cheese making, K. TEICHERT (*Milch Ztg., 39 (1910), No. 2, pp. 13–17*).—A summary of investigations on abnormal milks due to the presence of pathogenic and other undesirable species of bacteria.

The composition of cream, R. R. TATLOCK and R. T. THOMSON (*Analyst, 35 (1910), No. 406, pp. 5–8*).—Trials are reported which show that whatever the method of creaming the solids of the nonfatty portion of cream are slightly higher than those in the corresponding portion of the milk from which it has been taken, but that the difference has no practical significance and may be disregarded.

Layer cheese, M. SIEGFELD (*Molk. Ztg. [Hildesheim], 24 (1910), No. 6, pp. 95, 96*).—A description is given of "layer" or "cream layer cheese" which is composed of alternate layers of cream and skim milk curd. Analyses of the different layers in 17 cheeses obtained from various localities are reported. The percentage of fat in the total cheese mass varied from 5.1 to 24.2.

Sap sago cheese, P. BUTTENBERG and W. KOENIG (*Ztschr. Untersuch. Nahr. u. Genussmtl., 18 (1909), No. 7, pp. 413–415; abs. in Milchw. Zentbl., 6 (1910), No. 1, pp. 32, 33*).—Analytical data are reported.

Literature on the science and practice of dairying in the second half of 1908 and the first half of 1909, R. W. RAUDNITZ (*Separate from Monatsschr. Kinderheilk., 8 (1909), No. 5, pp. 64*).—A list of publications during this period, with abstracts of the more important articles.

Questions and answers on milk and milk testing, C. A. Publow and H. C. Troy (*New York and London, 1909, pp. 97, pl. 1*).—These questions and answers were prepared especially for short-course students in dairying and for those who wish to prepare for civil service examination for positions in dairy work.

Questions and answers on butter making, C. A. Publow (*New York and London, 1909, pp. 75*).—These questions and answers are prepared especially for short-course students and for practical butter makers who wish to pass a civil service examination in butter making.

VETERINARY MEDICINE.

[Report of the bacteriologist on work with animal diseases], C. E. Marshall (*Michigan Sta. Rpt. 1909, pp. 127-143, figs. 2*).—The work with hog cholera is reviewed, directions given for the use of the immunizing serum, now being prepared, as previously noted (E. S. R., 21, p. 790), and the results obtained by W. Giltner in 49 cases reported.

A method for treating contagious abortion of cattle is outlined. The occurrence of a disease among cattle at Saline, Mich., infectious anemia or swamp fever of horses in the northern peninsula, and an undetermined disease of sheep near White Pigeon, Mich., are briefly reported upon by W. Giltner. Two cases of suspected omphalophlebitis in lambs and a case of traumatic serous inflammation with septicemia, in a Shorthorn heifer, are also reported by Dr. Giltner.

[Report of the veterinarian], E. Barnett (*South Carolina Sta. Rpt. 1909, pp. 39-44*).—In experiments made to determine the physiological effects of cotton-seed meal when fed in large quantities to dairy cattle "a number of abortions took place besides a number of cases in which difficulty was experienced in getting animals pregnant, and it appeared there was a fairly constant relation between these troubles and the amount of cotton-seed meal fed, depending also upon the weight of the animal and the amount fed about the period of conception. In some instances there has been noticed a peculiar form of mammitis, notably in the case of a Jersey cow in which attacks had occurred during a previous 2 years at intervals of from 2 weeks to 2 months and had become so bad as to threaten to destroy the usefulness of this cow. During most of this period 6 lbs. daily of cotton-seed meal had been fed."

An experiment was also conducted to determine if cotton-seed meal could be fed profitably to hogs in small amounts and to study the pathological changes in organs from hogs killed by cotton-seed meal. The results indicate that it can not be safely fed to hogs even in small amounts for an extended period, and also point to the fact that it contains a specific toxin which affects first the lymphatic glands draining the digestive tract, and secondly, the lungs.

Work on the immunization of hogs against hog cholera in cooperation with the Bureau of Animal Industry of this Department is reported.

Experiments in continuation of the investigation of the stomach worm and hook worm disease of young calves indicate that animals over 5 months old do not very readily become infested with the ensheathed form of the larvæ, though this has been generally supposed to be the usual manner of infestation.

Report of the state veterinarian for 1908, L. A. Klein (*Ann. Rpt. Penn. Dept. Agr., 14 (1908), pp. 110-128*).—A brief report of the work of the year including an account of the occurrence of stock diseases.

Report of the colonial veterinary surgeon, Hongkong (*Abs. in Jour. Trop. Vet. Sci., 5 (1910), No. 1, pp. 209, 210*).—The total number of cattle admitted to the government depots for the year was 42,098, a decrease of 17,901. The total number of pigs admitted to Kennedy Town was 168,682 against 186,728 in 1907,

and of sheep 30,118 as against 28,349. In regard to fresh beef and mutton, it is stated that 338,270 and 301,239 lbs. respectively were imported from Australia.

Among the diseases reported as occurring at the depots are foot-and-mouth disease, anthrax, rinderpest, and black quarter. A few cases of whipworm (*Tricocephalus affinis*) were found in young animals and large numbers of filariæ were discovered in the walls of the aortas of Chinese cattle and water buffaloes. *Stomoxys calcitrans* and the horn fly are the two most common flies in cattle sheds, both causing cattle a great deal of annoyance.

Observations on rabies, with special reference to an atrophic form of the disease occurring in animals, G. Lamb and A. G. McKendrick (*Sci. Mem. Med. and Sanit. Depts. India, n. ser., 1909, No. 36, pp. 34*).—"A virus originally obtained from a dog in the street was passed through a series of 13 dogs, by subdural inoculation or by intraocular injection. An increase of virulence resulted. The virulence of the virus was also increased for the rabbit. Negri bodies were demonstrable in certain cells of the central nervous system of the dogs of the first few passages, but not in the same cells of the animals of the later passages."

"Several cases of a form of rabies in the rabbit, in which progressive emaciation is the chief symptom, are described. This type has been observed to follow both subcutaneous inoculation of fixed rabbit virus and subdural injection of street virus. The disease generally runs a more or less chronic course but may be comparatively rapid. The fact that this condition is true rabies has been experimentally demonstrated. On subpassage from animals dead of this form of the disease typical symptoms of rabies in the rabbit have developed. Rabbits showing symptoms of progressive emaciation after injection of rabies virus have been observed to recover completely. Finally this type of the disease has been observed in a dog infected in nature."

The hereditary transmission of immunity against rabies, D. Konrádi (*Centbl. Bakt.* [etc.], *1. Abt., Orig., 52 (1909), No. 4, pp. 497–515; abs. in Vet. Rec., 22 (1910), No. 1130, p. 587*).—Seven series of investigations conducted upon dogs which had been immunized against rabies by the methods of von Hogyes, in which young animals from the same litter were tested one after another at various intervals of time as regards their resistance to rabies, thus estimating the duration of immunity, are here reported. The investigations yielded the following conclusions:

Immunity against rabies is transmissible by heredity. The father scarcely plays any part in the transmission of immunity, but the mother transmits it, not only when she is immunized during pregnancy, but also when she has been immunized before conception. The capacity for transmission of immunity against rabies seems to increase during successive pregnancies. The immunity is only transmissible to the first generation, and completely disappears in the further descendants. The offspring of immunized animals show individual differences as regards the inheritance of immunity, many inheriting it and others not. Both inherited and acquired immunity against rabies are of much longer duration than has hitherto, in accordance with the researches of Ehrlich, been supposed. The blood serum of animals with inherited or acquired immunity has no rabicide action upon the street virus. The practice of immunization before conception is very advisable, and can be of great utility.

The author emphasizes the necessity in reporting investigations of stating the length of time during which infected animals are observed, as otherwise it is very easy to reach erroneous conclusions.

Investigation of the cause and means of prevention of Rocky Mountain spotted fever carried on during 1907–8, H. T. Ricketts (*Bien. Rpt. Bd.

Health Mont., 4 (1907–8), pp. 77–191).—This account consists of 2 reports, the first of which was transmitted January 15, 1908, the second December 12, 1908.

In the first (pp. 87–130), the investigations conducted up to the time of transmission are reported, the life cycle of the tick which transmits the disease (*Dermacentor venustus*), experimental work with the tick in relation to spotted fever, hereditary transmission of spotted fever in the tick, the existence of infected ticks in nature, tick eradication, etc., being considered.

The second report (pp. 131–191) includes investigations relating to the source of infection for ticks and the means by which the disease is kept active from year to year. By hereditary transmission of the causative agent which takes place in the tick in a certain percentage of cases (more than 7 per cent and less than 50 per cent), it has been kept alive in some into the third generation. The existence of spotted fever in a number of distinct foci separated by zones in which the disease does not occur is further evidence that some source of infection for the ticks, other than man, exists in nature.

The disease was found to be acute in the gopher or ground squirrel; after recovery from the disease their blood was free from the virus. Ticks were found to transmit the disease from the guinea pig to the gopher and also from the gopher to the guinea pig. Experiments with the gopher showed it to be possible for this animal acting in conjunction with the tick to be responsible for the maintenance of spotted fever from one year to the next. Studies carried on show the rock squirrel, woodchuck, chipmunk, and mountain rat to be susceptible to spotted fever and to serve as hosts for *D. venustus*, and indicate that at least the first three as well as the gopher may, when acting in conjunction with the tick, be effective in maintaining the disease by causing its extension among the ticks. It is shown that in Idaho the infection is transmitted by a different species of Dermacentor and that it is less virulent.

Under the heading of hosts of ticks, the author reports that adult ticks have been found to feed mainly on the larger animals, such as the horse, cow, and certain of the wild animals, as the deer, elk, and mountain goat. The spotted fever tick of Idaho was found on snowshoe rabbits in large numbers in all stages of their development and at one time. "The gopher, rock squirrel, and pine squirrel are utilized as hosts by the larvæ and nymphs to an extensive degree, and the same is true, but perhaps to a smaller extent, of the chipmunk, woodchuck, and mountain rat. Minute ticks have also been reported to me as occurring on the rock rabbit."

As regards prophylaxis, the author considers the most effective single method to consist of oiling the horses, cattle, dogs, other domestic animals on which this tick feeds extensively, from about March 15 to about June 15. The clearing of land which affords protection to the ticks and some of the small hosts on which they feed is another aid, while the destruction of the small wild animals mentioned may be of value in destroying hosts for the tick and possibly hosts for the virus of spotted fever.

Bibliography of trypanosomiasis, C. A. Thimm (*London: Sleeping Sickness Bur., 1909, pp. 228*).—This publication contains almost complete lists of original papers on sleeping sickness and the trypanosomiases of man and animals from 1803 to March 31, 1909, and references to works and papers on tsetse flies, especially *Glossina palpalis*. The arrangement is by authors in alphabetical order, the papers being given again under the names of the journals in which they appeared. Against each original reference is an index number.

Subject index to the bibliography of trypanosomiasis, C. A. Thimm (*London: Sleeping Sickness Bur., 1910, pp. 47*).—The additions and corrections

appended to this subject index are so printed that each slip can easily be cut off and attached to the bibliography above noted in the proper place.

Trypanosomiasis observed in horses of the Sahara, BARDOT (*Rec. Hyg. et Méd. Vét. Mil., 10 (1909), p. 522; abs. in Rev. Gén. Méd. Vét., 15 (1910), No. 170, pp. 103, 104*).—A trypanosomiasis of camels and horses is reported to occur in South Oran. In the camel it runs a chronic course, but is acute in the horse, to which it proves fatal in a large percentage of cases.

The transmission of Trypanosoma equiperdum, H. SIEBER and R. GONDER (*Arch. Schiffs u. Tropen Hyg., 12 (1908), No. 11, p. 646; abs. in Jour. Trop. Vet. Sci., 4 (1909), No. 4, p. 584*).—The authors state that they apparently succeeded in transmitting dourine from an infected to a healthy animal by means of *Stomoxys calcitrans*. There did not seem to be any development of the trypanosome in the fly, the transmission appearing to be purely mechanical. Attempts to transmit the trypanosome from an infected to an uninfected rat resulted negatively.

Contribution to the study and etiology of souma, G. PÉCAUD (*Bul. Soc. Path. Exot., 2 (1909), No. 9, pp. 530–532; abs. in Sleeping Sickness Bur. [London] Bul. 12, p. 457*).—Fourteen specimens of *Glossina palpalis* were collected on the banks of a lagoon near Porto Novo where there was a small herd of cattle in 3 members of which *Trypanosoma cazalboui* had been found. The flies were put on a healthy sheep on 3 successive days, and 14 days after the first bites *T. cazalboui* was found in the sheep. The author now believes that distant transmission of *T. cazalboui* is effected by tsetse flies and immediate transmission by Stomoxys and tabanids. Evidence was obtained that Stomoxys transmitted the disease in the stable and an appended note adds that a recent observation shows the same to occur with *T. dimorphon*.

Report of the results of investigations in German East Africa in 1906–7 by the German Sleeping Sickness Commission, R. KOCH, M. BECK, and F. KLEINE (*Arb. K. Gsndhtsamt., 31 (1909), No. 1, pp. 320, pls. 5, figs. 100, charts 65, maps 6; abs. in Sleeping Sickness Bur. [London] Bul. 11, pp. 420–429*).—The chapters on etiology and on general preventive measures are by R. Koch; those on diagnosis, symptoms, and treatment, and also the account of cases, are by M. Beck; while part of the chapter on preventive measures is by Kleine. The distribution of *Glossina palpalis* and of sleeping sickness and the route followed are shown on maps.

[How tubercle bacilli enter the body], P. CHAUSSÉ (*Rec. Méd. Vét., 86 (1909), Nos. 17, pp. 573–579; 19, pp. 640–649; abs. in Rev. Gén. Méd. Vét., 15 (1910), No. 170, pp. 89–91*).—A critical review of the subject in which it is concluded that the bacilli enter the body largely by inhalation.

A contribution to the study of the vaccination against tuberculosis of cattle by Klimmer's method, E. GLÖCKNER (*Berlin. Tierärztl. Wchnschr., 25 (1909), No. 16, pp. 292–294; abs. in Bul. Inst. Pasteur, 7 (1909), No. 15, pp. 659, 660*).—Of the several methods of vaccinating cattle against tuberculosis, the author prefers that of Klimmer. In this method tubercle bacilli of the human type which have been attenuated by heating to from 52 to 53° C. and bacilli rendered avirulent by passage through the salamander are used. The author vaccinated, by single injections 23 young animals of which 4 had reacted to tuberculin.

After a year in contact with cows suspected of tuberculosis, one of the animals which had not reacted was killed and found to be free from the disease. Two of those which had reacted to tuberculin previous to vaccination were killed at the same time and lesions found which had completely calcified. The author concludes that this vaccine not only has an immunizing but also a cura-

tive effect. For young animals the subcutaneous vaccination gives better results than the intravenous. This vaccination confers immunity only after 2 months, during which period the animals must be isolated and suckled by healthy cows or fed sterilized milk.

Vaccination against tuberculosis of cattle, S. ARLOING (*Rev. Gén. Méd. Vét., 14 (1909), No. 168, pp. 781–794*).—This is a paper presented at the meeting of the International Veterinary Congress held at The Hague in September, 1909, relating to the practical results which have been obtained in immunizing cattle.

Diffuse hypertrophy of the mucous membrane of the intestines of cattle caused by acid-fast bacteria [Johnes disease], K. F. MEYER (*Über die durch säurefeste Bakterien hervorgerufene diffuse Hypertrophie der Darmschleimhaut des Rindes. Jena, 1908, pp. 107, pls. 3, fig. 1; rev. in Rev. Gén. Méd. Vét., 15 (1910), No. 170, pp. 91–93*).—The author's investigations confirm those of Bang on chronic pseudotuberculous enteritis of cattle. The affection is said to occur very frequently in the cantons of Bern, Zurich, Freiburg, Waadt, and Aargau, Switzerland.

Hog cholera and vacciation, F. S. SCHOENLEBER (*Kansas Sta. Bul. 163, pp. 259–276, figs. 12*).—A detailed account of the method of production of hog cholera serum and of its use in immunizing against the disease. It is stated that during 1910 the station expects to produce over 100,000 doses.

The frequence and nature of cystic kidneys in the pig, MARCHESINI and BARTOLINI (*Abs. in Vet. Rec., 22 (1910), Nos. 1122, p. 455; 1123, pp. 469, 470*).—Within a period of 2 years the authors have examined the kidneys of 80,000 pigs killed in the abattoir at Rome and studied cystic kidneys, which have, by many observers, been confounded with hydronephrosis. From 4 to 5 per cent of the pigs examined were affected, sometimes only one kidney being cystic and sometimes both.

Equine piroplasmosis in Russia and the rôle of the tick Dermacentor reticulatus in its spread, E. J. MARZINOWSKI and A. W. BIELITZER (*Ztschr. Hyg. u. Infektionskrank., 63 (1909), No. 1, pp. 17–33, pls. 6; abs. in Jour. Trop. Vet. Sci., 5 (1910), No. 1, pp. 200, 201*).—This disease was first observed in Russia in the Smolensk government by Michailof in 1902. In 1906, it was reported by Bielitzer from the Ryasan government. It also occurs in the Tambov government and from precinct reports is known to frequently occur in the Moscow, Vladimir, and Ufa governments.

The disease has been found to be transmitted by *D. reticulatus*. Larvæ placed upon rabbits attached to the eyelids and ears, engorged, and dropped in 2 or 3 days. Larvæ which became quiescent June 26 emerged as nymphs July 1. Five engorged nymphs removed from the host July 12–13 emerged as adults on July 29. It is stated that larvæ may live 6 months while waiting for a host. Some 500 seed-ticks were placed upon a horse, but none engorged and no piroplasms appeared in the blood. The authors conclude that the larvæ were unable to penetrate the skin and that in nature they probably engorge upon small animals. Because of the scarcity of nymphs no transmission experiments were conducted with that stage.

Horses were subcutaneously injected with a solution in which infected larvæ had been crushed, but no piroplasms appeared in the blood. Piroplasms appeared in the blood 12 days after the first adult was placed upon the host. The disease was also reproduced in 3 cases by the injection of infected blood, all of the animals recovering without treatment. Attempted transmission to the rabbit, guinea pig, and puppy, and the culture of the parasite, failed. In treatment, digitalis and camphorated oil were used as heart stimulants, alkalies per os and per anum, and against the parasites quinin, mercury, and arsenic.

The intramuscular injection of 10 cc. of a 2 per cent solution of bichlorid of mercury per day gave the best results. It is stated that Saikowitsch, working in the Ryasan government, had but 140 deaths out of 529 cases where this treatment was practiced. See also a previous note (E. S. R., 20, p. 984).

Equine piroplasmosis in southern Russia (Kherson government), N. A. Michin and W. L. Yakimoff (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 6 (1909), No. 3-4, pp. 265-269, pl. 1; abs. in Jour. Trop. Vet. Sci., 5 (1910), No. 1, pp. 203, 204*).—This disease was observed by one of the authors in southern Russia in the early part of May, 1908, and during the summer was discovered at 5 points in the Kherson government, and also in a horse from the Ekaterinoslaf government. From a total of 400 horses in the infected places, 61 cases occurred, 17 during May, 26 in June, and 18 in July. The infected area was in the vicinity of the Ingulez River where the pastures are covered with brush. Ticks, determined by Neumann as *Hyalomma ægyptium*, were found on all the affected horses. In treatment the best results were obtained from intramuscular injections of a 2 per cent solution of bichlorid of mercury, with administrations of quinin and cardiac stimulants.

The treatment of surra in horses by means of arsenic and its derivatives. Thirty-two cases of successful treatment, J. D. E. Holmes (*Jour. Trop. Vet. Sci., 5 (1910), No. 1, pp. 1-45, pls. 15*).—Following a brief historical review of the chemotherapy of trypanosomiasis, the author reports in detail experiments in which were tested the value of atoxyl, soamin, mercury, antimony salts, and arsenious acid alone and with atoxyl, in the treatment of surra. The experiments indicate that arsacetin is equal in toxicity to atoxyl and that its administration has much the same effect on the trypanosomes. Soamin is also considered about equal in value to atoxyl. It is equally toxic when injected subcutaneously, but when administered by the mouth, appears to be much less toxic than atoxyl. Mercury alone had little effect on the course of the disease, and in combination with atoxyl, the results were not so good as when atoxyl alone was used.

"Tartar emetic in 1 per cent solution, injected intravenously, has a rapid but temporary effect on the trypanosomes in the circulation. Administered by the mouth, it has no influence on the course of the disease. Injected subcutaneously in very dilute solutions it causes local irritation, frequently followed by necrosis of the skin, at the seat of inoculation. . . . Arsenious acid is, undoubtedly, a specific for surra in horses. It must be administered in full subtoxic doses and at intervals, and not in continuous daily dosage. In the light of these results it is clear that, in the early experiments conducted by Lingard, Brûce, and others, arsenic was given in too small an amount, and in continuous treatment. Animals can not tolerate the requisite amount of arsenic if the dose be too frequently repeated. . . . It is doubtful whether any advantage is gained by combining atoxyl with arsenious acid in the treatment of surra. The results of treatment with arsenious acid alone, given in 10 doses at an interval of one day, were superior to those arsenious acid was alternated with atoxyl."

"All our observations on the action of atoxyl are in support of the view that a small amount of cleavage occurs and that the therapeutic effect is entirely due to the presence of free arsenic."

On the antiphagines [aggressins] of the chicken cholera organism, N. Tchistovitch (*Ann. Inst. Pasteur, 23 (1909), No. 10, pp. 834-840*).—From the investigations here reported the author arrives at the following conclusions:

Virulent cultures of the chicken cholera organism contain antiphagines which protect the microbe from phagocytosis; the antiphagines can be more or less easily removed from cultures of the microbe, which then becomes the prey of

the phagocytes; the addition of antiphagines to a but slightly virulent culture of the organism protects it from phagocytosis; the action of these antiphagines is specific, that is, they only prevent phagocytosis of the species of microbe from which they arise; and the antiphagines protect this organism only in the animal species for which it is pathogenic. The fact that the leucocytes of various animals behave differently toward the chicken cholera microbe can not be entirely explained by the difference in quantity of the opsonins in the serum of these animals.

An epidemic among geese caused by the Bacillus septicæmiæ anserum exsudativæ of Riemer, together with a contribution to the knowledge of the pseudo-influenza bacilli, P. FROSCH and K. BIERBAUM (*Centbl. Bakt.* [*etc.*], *1. Abt., Orig., 52* (*1909*), *No. 4, pp. 433–440, figs. 6; abs. in Vet. Rec., 22* (*1910*), *No. 1130, p. 587*).—Bacteriological investigations of an epidemic among geese which occurred near Franzburg, Germany, are reported. Although the appetites of the birds were maintained, they rapidly became emaciated and died of debility. As the causal agent of the disease, the authors established a slender bacillus with distinctly rounded ends, which was present in great numbers in the cardiac blood, in the pericardial fluid, and in fibrinous deposits upon the heart, the liver, and the intestinal coils.

Cultivation was at first successful only upon nutrient media containing hemoglobin, but afterwards succeeded upon media without this addition. The bacillus proved to be pathogenic for geese only, and its pathogenicity was most marked when introduced by intramuscular inoculation. An adult goose could not be infected by feeding with the organs of one that had died of the disease after being artificially infected. The virulence of the cultures rapidly became attenuated unless kept up by regular passages through geese.

The authors consider this organism to be the same as that found by Riemer in an epidemic of geese in Mecklenburg, and described by him as *B. septicæmiæ anserum exsudativæ*. They incline to the opinion that on the ground of its morphological and biological characteristics, it must be classed in the influenza group of bacilli.

A bibliography of 18 titles is appended.

Stomach worms, hookworms, and other parasites of the digestive tract of ruminants, A. F. CONRADI (*South Carolina Sta. Rpt. 1909, pp. 65–89*).—This report is largely devoted to investigations of the stomach worm. See also a previous note (E. S. R., 21, p. 181).

This worm (*Hæmonchus contortus*) occurs normally in the fourth stomach but may be found more or less abundantly in the small intestines during the post-mortem examination of animals that die. While in the alimentary canal the worms mate and the females lay minute eggs which are excreted in the feces. The eggs are very sensitive to cold, heat, and drought, and may be killed by freezing temperatures as well as by exposure to drought for a short time. "In a temperature of 88 to 98° F. hatching occurs in from 24 to 48 hours, and as the temperature falls the time required for hatching increases. There was no development in infested manure dropped November 14, 1908, and left in the pasture under natural conditions of temperature and moisture on the shady side of a tree. A small percentage of eggs hatched outdoors during the warm weather occurring during the third week of November, 1908. When the temperature falls to 60° in the laboratory incubation may require from several weeks to a month, and at 40° all activity is practically discontinued. . . .

"In from 6 days to 2 weeks, depending on the temperature and moisture, the young larvæ reach their complete growth in the free state, the maximum

growth taking place when the temperature ranges from 90 to 94°. At a temperature of from 60 to 75° this may require 2 to 3 weeks. Only one molt was observed, but from micrometer measurements it would appear that there are two before the final molt in the free stage. When the free larvæ become full-grown they reach what may be called a pupal stage. Most of them secrete a covering about themselves, inside of which the activities of the larva may be observed. This covering is called a sheath and when completed practically seals the inclosed larva. The ensheathed worm is from 625 to 800 microns in length and has the rear end elongated into a sharp point. . . . The length of time the various stages of the worms may remain alive varies greatly with the environment and probably with the individuality of each worm to some extent. . . .

"In moist cultures in the open cages in the laboratory to which no water was added, during the winter of 1908, the ensheathed worms were all dead after a period of 93 days. Fresh material heavily infested, collected October 14, 1908, was put in cages outdoors after 85 per cent had ensheathed. The cages were made of glass open at top and bottom to give as nearly out-of-door conditions as possible. The maximum hatching occurred on October 29, 1908. The ensheathed larvæ attached to the glass wall of the breeding cage were examined at frequent intervals and after February 17 no live worms could be found. . . . It was particularly noticed that manure kept for 7 months in open outdoor cages and which had to be soaked in water for some time before a slide could be made for examination, contained more live, full-grown free worms than the breeding cage walls."

Young worms from infested feces which had been buried in sand to a depth of 5 in. were found to come to the surface without any apparent obstruction, and it is concluded that cultivation can not be depended upon to relieve the situation under ordinary field conditions. It is thought that, as the worms occur mostly in the mucous secretions between the ingesta and the mucous membrane, their principal food consists of this mucus. The relation of maximum infestation to the time of death or recovery of 20 animals studied is shown in diagrammatic form from data obtained in 1908 by making daily fecal examinations. It appears that the heaviest infestation occurred during June and that another increase of infestation took place in some animals in September.

The seasonal and post-mortem records of 30 calves used in the experiments in 1908 are also reported. In this study the author finds that "in case of two calves of the same age on same pasture and giving about the same egg record, one may die, the other survive. In case of two calves of same age on same pasture, one having much higher egg record than the other, the animal with the lower egg record may die while that with the higher egg record may not even show symptoms of being affected by the infestation. In case of two calves, one having a low egg record of short duration, the other a low, prolonged egg record, the former may die, the latter survive."

As young worm-free calves put on infested pasture show eggs in small numbers in the feces in about 4 weeks, it appears that this is approximately the time required for the young worms to complete their growth after they are taken into the body.

In reviewing the data relating to seasonal occurrence of injury at the station, the author considers it evident that the percentage of death during a single season is governed to a great extent by the amount of precipitation during the main growing season, from June to September. The principal injury is said to be done to spring calves. It is concluded that the intestinal parasites are eliminated from the animal at approximately 14 months and sooner in

some cases. During the investigation examinations were made of the feces and alimentary canal of animals other than ruminants, including the horse, pig, rabbit, dog, etc., a brief report of the findings being here included.

In regard to the prevention and remedial measures, the author concludes that "the animals should have plenty of wholesome food and especially during late summer and fall when pastures become scant. The animals should have access to plenty of fresh water, preferably running water, and no muddy or swampy conditions should be tolerated about watering places. During a moist season when the disease is worst the pasture should be changed, always keeping the animals on upland. . . . Where the raising of late summer or fall calves is practicable [intelligent rotation of land] will greatly eliminate this disease."

Some helminthiases observed in Tunis, Weinberg and Romanovitch (*Arch. Inst. Pasteur Tunis, 1909, Feb.; abs. in Rec. Méd. Vét., 86 (1909), No. 23, pp. 841, 842*).—Lesions in cattle due to *Amphistomum conicum*, Dreschsler's nematode, and *Pentastoma denticula* are considered.

Mammalian leucocytozoa, S. R. Christophers (*Jour. Trop. Vet. Sci., 4 (1909), No. 2, pp. 232–234*).—An account taken from the report of the King Institute of Preventive Medicine.

Some clinical tests of the action of antistreptococcic serum, N. Mori (*Clin. Vet. [Milan], Sez. Prat., 32 (1909), No. 22, pp. 337–341; abs. in Rev. Gén. Méd. Vét., 14 (1909), No. 168, pp. 802, 803*).—From the results obtained during an epidemic of strangles in which an antistreptococcic serum prepared at the military bacteriological laboratory at Rome was used, the author concludes that it has some curative as well as high preventive properties.

Biological albumin differentiation procedure, with special reference to the forensic examination of blood and meat, and the obtaining of precipitizing sera, P. Uhlenhuth and O. Weidanz (*Praktische Anleitung zur Ausführung des biologischen Eiweissdifferenzierungsverfahrens mit besonderer Berücksichtigung der forensischen Blut- und Fleischuntersuchung, sowie der Gewinnung präzipitierender Sera. Jena, 1909, pp. 246, figs. 38; Handb. Tech. u. Methodik Immunitätsforsch., 2 (1909), pp. 721–833, figs. 29; rev. in Vet. Jour., 65 (1909), No. 414, pp. 640, 641*).—This work deals exhaustively with the effects occasioned by antisera on different kinds of blood. An extensive bibliography is appended.

Medical pocket dictionary in eight languages, edited by J. Meyer (*Lexicon Medicum. Berlin and Vienna, 1909, pp. XXVIII+788*).—This dictionary includes about 5,500 words in each of the following languages: German, English, French, Italian, Japanese, Russian, Spanish, and Hungarian.

RURAL ECONOMICS.

A critical examination of and contribution to the problem of intensive culture, T. Brinkmann (*Fuhling's Landw. Ztg., 58 (1909), Nos. 23, pp. 833–850, dgm. 1; 24, pp. 873–890, dgms. 5*).—This article critically examines the relation that exists between the degree of culture given to land and the productiveness of land, labor, and capital. The author summarizes his conclusions as follows:

(1) An inductive-statistical examination of the returns as a result of changing degrees of intensive culture in agriculture must take into consideration both gross returns and total expense. A comparison of the gross income with definite expense items means nothing as to the real relation of expense and yield.

(2) Practically, that is on individual farms, the operation of the law of diminishing returns can not be determined, because this law according to its

accepted definition and also logically deals only with the relation of expense and yield in similar conditions of technical knowledge.

(3) With the increase of population, the increasing intensive culture in agriculture leads to a decrease in the cost of labor in relation to the value of the products. This decrease is a result of the universal operation of the law of productiveness. While the yields of land must be materially secured in a more unproductive way, the price of products increases more rapidly than the price of labor, and so also the value of the total products of a business increases more rapidly than the value of the proper labor expense and of the expense in general.

(4) Moreover, the dearer labor becomes in relation to the value of manufactured means of production used in agriculture, the more the productiveness of labor, in comparison with the last-named form of productiveness as a result of the increase in intensive culture, must approach to ever narrower limits. For as the limits of the profitableness of capital are reached more rapidly than in the case of labor, the latter must be supplied by capital. If man seeks in the sphere of individual operations for phenomena which can be traced back to the operation of the law of productivity, the relative decrease in the cost of labor is undoubtedly one of the most striking. But at the same time there is no such thing as a law of diminishing cost of labor in the sense of an opposite tendency to the very characteristic phenomenon of land productivity.

(5) As a systematic inquiry, the investigation has confirmed the conviction that in searching for the fundamental principles and laws of agriculture, the statistical method promises smaller results than the deductive interpretation of absolutely known facts. The signification of statistics does not lie primarily in the province of induction, but rather in the verification of that which has already been learned as a result of induction.

The recent agricultural strike and its influence on rural economy, P. VINCEY (*Bul. Soc. Agr. France, 1909, Oct. 6, pp. 784–794*).—This paper, presented at a meeting of the National Society of Agriculture, held October 27, 1909, discusses the economic effects of a strike declared simultaneously on July 12, 1909, by all the laborers employed on the farms owned by the City of Paris and let out to operators engaged in various branches of the agricultural industry.

The strike was settled on the following day in most instances, the operators conceding a higher rate of wages ranging from 9.2 to 24.6 per cent increase to the different grades of farm laborers, not from any sense of justice but rather from the danger of losing their entire crops. The economic effects of this increase in wages on the returns to the operators, who were able to secure no higher prices for their products, as well as on the future operation of these farms involving less hand labor, are presented.

The paper is followed by a discussion in which the relation of the strike to the high cost of living is given prominence.

Agricultural labor, J. M. É. IZAGUIRRE (*Prog. Agr. y Pecuario, 16 (1910), No. 658, pp. 7, 8*).—This article compares the numbers of workers in agriculture and industry in England, France, and Spain, and points out the great disproportion of agricultural laborers to industrial laborers in Spain as compared with the other countries. Thus Spain, with a population of about 20 millions, has about $7\frac{1}{2}$ millions of workers of whom more than $4\frac{1}{2}$ millions are engaged in agricultural pursuits; while France has about 40 millions of inhabitants, with more than 14 millions of workers, of whom less than $5\frac{1}{2}$ millions are engaged in agriculture.

The disproportion between agricultural and industrial laborers is regarded as the cause of the depression of agriculture in Spain, resulting in serious competition for work, overcrowding of cities, and emigration. The remedies

suggested for the improvement of rural conditions are agricultural organization, rural credit, the breaking up of the large estates ("latifundi"), and agricultural education.

Leongatha labor colony, E. J. NEVELL ET AL. (*Jour. Dept. Agr. Victoria, 7 (1909), No. 11, pp. 704–722, figs. 13*).—This is the report of the trustees for the year ended June 30, 1909.

The colony is established for the purpose of giving work to the unemployed in Victoria. Of 482 men admitted in 1909, 48 different trades or occupations were represented, but many of these men go to the colony for the express purpose of learning something about agriculture. They receive board, lodgings, and pay for their labor, and are free to seek work at their respective callings. During the year there was a great demand for the colonists by the local farmers.

The colony receives government aid at present, obtaining nearly £544 in 1909, but the aim is to make it self-supporting from the sale of live stock and produce raised on the farm which at present comprises 420 acres. The different lines of work and the care and training of the colonists are described and illustrated.

Cooperative agricultural credit, E. H. GODFREY (*Canad. Farm., 2 (1910), No. 3, p. 8*).—This article describes the origin, development, and present status of the Raiffeisen and Schulze-Delitzsch credit banks in continental Europe, and the introduction, modification, and growth of similar credit banks in Great Britain, Ireland, and Canada.

A bank for the encouragement of farming, T. POGGI (*Coltivatore, 56 (1910), No. 3, pp. 65–68*).—This article points out the advantages of a bank of credit for the encouragement of farming in Italy.

A plan is outlined for the cutting up of the "latifondi" or large estates into large, medium-size, and small farms, the function of the bank of credit being to assist the unemployed to settle on the small holdings by supplying them with houses, buildings, live stock, and implements, with the ultimate object of enabling the tenants of the small holdings to become the owners. This plan it is believed would make the large estate more profitable than at present, stop emigration, encourage agricultural labor, and increase the resources of the country.

The possibility and significance of determining the cost of producing agricultural products, STIEGER (*Jahrb. Deut. Landw. Gesell., 24 (1909), No. 4, pp. 950–989, figs. 4*).—This paper, delivered before the German Agricultural Society at Berlin, October 21, 1909, brings together a vast amount of data that have been secured within recent years in Europe and America as to the cost of raising farm products under various conditions of climate, culture, fertilizing, cropping, stock raising, etc., and discusses their significance from the economic point of view. The complex nature of stock and crop raising renders the problem of determining their cost of production an exceedingly difficult one to solve on a strictly scientific basis.

North Dakota farm account (*Farmer, 28 (1910), No. 6, p. 180*).—The farm contained 1,112 acres, of which 485 acres were in crop in 1909. The total cost of raising wheat, barley, and oats was $1,955, and the value of the crop $5,300. This gave the cost and value of raising small grains at $4.55 and $12.32 per acre, respectively. Corresponding figures for corn were $5.30 and $14.12. The net profit for the year was $4,106, or an interest rate of 9.92 per cent on a farm valued at $37.50 per acre, or a total value of $41,400.

Cost of corn production, T. P. COOPER (*Farmer, 28 (1910), No. 6, p. 172*).—The average cost of corn production for the last five years as determined on several farms in Minnesota is given as $13.75 per acre, the details both for corn and other crops having been noted from another source (E. S. R., 21, p. 188).

Agriculture in New York: Its importance as shown by statistics, R. A. Pearson et al. (*N. Y. Dept. Agr. Bul. 9, pp. 186, figs. 22*).—The data tabulated and discussed in this bulletin relate to the number, acreage, and value of farms, the population engaged in agriculture, the kinds and value of farm products raised, etc., and are largely derived from the United States census of 1900.

Farming in Canada (*Rpt. Scot. Com. Agr. Canada, 1908, pp. 195, figs. 82*).—This is a report of the Scottish commission on agriculture in Canada in 1908, which discusses land settlement, the different lines of agriculture and stock raising, agricultural education and research, irrigation, cost of living, colonization, and other features of Canadian rural life.

Agriculture in Sweden at the commencement of the 20th century, É. Levasseur (*Rev. Écon. Internat., 7 (1910), I, No. 1, pp. 25–63*).—This article summarizes an atlas-volume by Fraenckel, which is described as the most important book of its kind that Sweden has published.

It discusses the climate and soil, the condition and movement of the population, the extent of territory and the amount under cultivation, crops and live stock raised, its forests, and the commerce of the country.

Exports of farm and forest products, 1906–1908 (*U. S. Dept. Agr., Bur. Statis. Bul. 77, pp. 91*).—Detailed statistics of exports of farm and forest products, including the countries to which consigned, are reported. In 1908 the value of farm products exported was $1,017,396,404, and of forest products $90,362,073, these being decreases from the values for 1907 which were $1,054,405,416 and $92,948,705, respectively (E. S. R., 20, p. 690).

Crop Reporter (*U. S. Dept. Agr., Bur. Statis. Crop Reporter, 12 (1910), No. 3, pp. 17–24*).—In addition to the customary information regarding the yield and condition of crops in the United States and foreign countries, this number gives data on the farm value and range of prices of agricultural products, the coffee crop for the years 1904–1908, a statement relative to the origin, purpose, and uses of the decennial census, and a reprint of Circular 31 of the Office of the Secretary which is abstracted on page 638 of this issue.

AGRICULTURAL EDUCATION.

Agricultural education: Extension work, departments of agricultural education, and summer schools for teachers, B. M. Davis (*El. School Teacher, 10 (1910), No. 6, pp. 277–286*).—This is the third article in the author's series on agricultural education.

It begins with a brief notice of the work of the agricultural colleges in introducing pioneer forms of extension work, such as farmers' institutes, farmers' conventions, farmers' excursions to the colleges, instruction trains, and demonstration farms. The earliest form of extension work through the circulation of college publications is attributed to Cornell University, and the most complete organization of boys' and girls' club work to Nebraska, under cooperation between the state college of agriculture and the state department of education. Extension work in the form of college departments of agricultural education is shown to be represented in 15 States, and a number of other agricultural colleges give courses in education to their students who expect to teach.

The article closes with a bibliography of books and periodicals on various phases of agricultural education.

Agricultural education for the rural districts, S. A. Knapp (*Addresses and Proc. Nat. Ed. Assoc., 47 (1909), pp. 954–959*).—The author discusses the rural education problem in the South as it appears to him, dwelling especially upon

the effectiveness of boys' clubs, and the need of teaching the young the care and importance of the garden, the poultry flock, and the cow, and how to care for them and realize the most from them.

Nature study, rural sociology, and agriculture for rural schools (*Mich. Agr. Col., Dept. Agr. Ed. Bul. 4, pp. 12, figs. 3*).—This bulletin is intended to be of special service to teachers in the Michigan county normal training classes.

Suggestions are offered in reference to teaching concerning the natural environment of rural pupils, including familiar natural objects, occupations, home affairs, civic relations and responsibilities, and the correlation of such instruction with language, geography, and other subjects of school study. Special work in elementary agriculture is advised for grades 5 to 9, and a working outline is offered in agronomy, horticulture, forestry, botany, entomology, ornithology, animal husbandry, and mechanics. A bibliography of helpful books and bulletins is included.

Common sense in negro schools, G. S. DICKERMAN (*Hampton Leaflets, n. ser., 5 (1909), No. 12, pp. 13, figs. 9*).—This is a description of domestic science and other forms of industrial work introduced into the negro public schools of Norfolk, Va., and vicinity by Miss S. E. Breed, in 1896, with a brief discussion of the educational and economic value of the work.

Agriculture in California schools, E. B. BABCOCK (*Sierra Ed. News and Book Rev., 6 (1910), No. 1, pp. 46–51*).—This is a description of the introduction of agricultural instruction into various California schools as previously noted (E. S. R., 22, p. 494), with a comparison of the work in California with that of other States, and an outline of a plan for so organizing "nature" or "science" teaching in the schools as to correlate it effectively with other subjects of instruction.

Agricultural education and research (*Rpt. Scot. Com. Agr. Canada, 1908, pp. 63–78, figs. 7*).—A consideration of the organization and work of agricultural education institutions in Canada, including rural schools, consolidated schools, Macdonald Institute, agricultural colleges, and farmers' institutes.

Elementary agriculture and horticulture and school gardens in rural and village schools (*Ontario Dept. Ed. Circ. 13, pp. 34, pls. 4, figs. 9, dgms. 2*).—An explanatory and descriptive circular, issued by the Ontario Department of Education, containing regulations in reference to grants of from $30 to $50 for maintaining such work in rural and village schools, the general purpose of the work itself, the organization of school garden plans, and the general care of the garden after planting. Suggestions for the equipment of school garden work, including a description of garden tools, seed supplies, and useful and helpful books, are included.

Manual of agriculture, D. O. BARTO (*Boston, 1910, pp. XIV+89*).—A set of 36 elementary exercises in soils and crops, with an introduction by Dean Davenport. This is essentially a laboratory manual for use in secondary courses in agronomy—not elementary but elemental.

Notes on soils, A. R. WHITSON and H. L. WALSTER (*Madison, Wis., 1909, pp. 149, figs. 4*).—This is an outline of an elementary course in the study of soils, embracing the origin of soil materials, humus, acidity, soil nitrogen, phosphorus and potash, soil texture, the behavior of water in soils, soil ventilation, barnyard manure, crop rotation, and soil management, with particular attention to Wisconsin conditions.

Free publications of the Department of Agriculture classified for the use of teachers, D. J. CROSBY and F. W. HOWE (*U. S. Dept. Agr., Office Expt. Stas. Circ. 94, pp. 29*).—This circular is designed to aid teachers and others in making a more discriminating selection and use of Department publications in connection with school work.

The classification of titles under general agriculture covers educational publications on school courses and school extension work; plant production, including agronomy (soils, fertilizers, field crops, and crop pests), horticulture, and forestry; animal production, including the ordinary farm animals and poultry; agricultural technology, including dairying and miscellaneous topics; agricultural engineering, including farm buildings, farm mechanics, road improvement, drainage, and irrigation; agricultural economics; and general and special publications adapted to teaching botany, chemistry, domestic science and hygiene, geography, physics, physiology, and zoology (including entomology). Cross references are freely used and directions and suggestions are given as to the best ways of obtaining both the free publications of the Department and those for which a price is charged.

Courses of reading and examinations in practical agriculture (*Imp. Dept. Agr. West Indies Pamphlet 1, 1910, n. ser., pp. 10*).

MISCELLANEOUS.

Twenty-first Annual Report of Alabama College Station, 1908 (*Alabama College Sta. Rpt. 1908, pp. 3–34*).—This contains the organization list of the station, a financial statement for the fiscal year ended June 30, 1908, and reports of the director and heads of departments covering the work of the station during the year.

Twenty-second Annual Report of Indiana Station, 1909 (*Indiana Sta. Rpt. 1909, pp. 72*).—This contains the organization list of the station, reports of the director and heads of departments, of which a portion of that of the horticulturist is abstracted on page 660 of this issue, a list of the bulletins and circulars issued by the station to January 1, 1910, and a financial statement for the federal and miscellaneous funds for the fiscal year ended June 30, 1909, and for the state funds for the fiscal year ended September 30, 1909.

Twenty-second Annual Report of Michigan Station, 1909 (*Michigan Sta. Rpt. 1909, pp. 115–428*).—This contains a financial statement for the fiscal year ended June 30, 1909, reports of the director and heads of departments on the work of the station during the year, the experimental features of which have been previously noted or are abstracted elsewhere in this issue, and reprints of Bulletins 252–255, Technical Bulletin 1, Special Bulletins 47–49, and Circulars 1–5, previously noted, and of press bulletins on the formalin treatment of wheat and oats for the prevention of smut, and on ways of preventing potato scab.

Twentieth Annual Report of South Carolina Station, 1907 (*South Carolina Sta. Rpt. 1907, pp. 32*).—This contains the organization list of the station, a financial statement for the fiscal year ended June 30, 1907, and reports of the director and heads of departments on the work of the station during the year, the experimental features of which are abstracted elsewhere in this issue.

Twenty-first Annual Report of South Carolina Station, 1908 (*South Carolina Sta. Rpt. 1908, pp. 39*).—Data corresponding to the above are presented for the fiscal year ended June 30, 1908.

Twenty-second Annual Report of South Carolina Station, 1909 (*South Carolina Sta. Rpt. 1909, pp. 127*).—Data corresponding to the above are presented for the fiscal year ended June 30, 1909, and in addition a condensation of Bulletin 146, previously noted, and several special articles abstracted elsewhere in this issue.

Nineteenth Annual Report of Wyoming Station, 1909 (*Wyoming Sta. Rpt. 1909, pp. 48*).—This contains the organization list of the station, a financial statement for the fiscal year ended June 30, 1909, reports of the director and heads of departments, and a meteorological summary for 1908 which is abstracted on page 615 of this issue.

NOTES.

Alabama College Station.—J. E. Toomer, assistant chemist in the Pennsylvania College and Station, has been appointed assistant chemist and has entered upon his duties.

California University and Station.—C. B. Lipman, who will receive the Ph. D. degree at commencement, has been appointed assistant professor of soils, and will offer several courses in soil physics and soil fertility which have been discontinued since the retirement of Dr. Loughridge. Cyril A. Stebbins, who has taught nature study and elementary agriculture for several years in the Chico Normal School, has been appointed instructor in agricultural education, and will assist in the introduction of nature study and elementary agriculture in the public schools of the State.

A demonstration train was sent out from April 4 to 16, traversing about seven hundred miles of the Southern Pacific System. It was manned by experts from the college and station staff and fitted up with illustrative material from the different departments.

Delaware Station.—Dr. H. P. Bassett, formerly of the North Dakota Station, has been appointed assistant chemist, largely for work under the provisions of the Adams Act, and entered upon his duties April 1.

Illinois University.—A conference on the teaching of agriculture in the common schools of Illinois was held at the college of agriculture March 24 to 26, for the purpose of obtaining an expression of opinion as to the plan to be followed in promoting the introduction of agriculture into these schools. There were addresses and discussions by several county superintendents of schools, instructors in normal schools and school directors, Dean Davenport and Professor Charles of the college of agriculture, Director W. C. Bagley, of the school of education, Frank H. Hall, superintendent of farmers' institutes, and D. J. Crosby of this Office.

Emory Cobb, a member of the board of trustees from 1867 to 1893, died April 14, aged 79 years. I. S. Brooks, assistant in pomology, has resigned to accept a commercial position in Colorado.

Indiana Station.—B. R. Ryall has resigned as assistant horticulturist to engage in county Y. M. C. A. work in Lake County, Ohio, where a special effort is to be made by this organization to aid in increasing the attractiveness of country life.

Iowa College.—Wayne Dinsmore, associate professor of animal husbandry, has accepted an appointment as secretary of the American Percheron Society at Chicago, and retires at the close of the college year.

Minnesota University.—At the commencement exercises of the school of agriculture during the week of March 21, 108 students were graduated. Milton M. Williams, of Little Falls, has been appointed to the board of regents.

Mississippi College and Station.—W. L. Hutchinson has been succeeded as director by J. W. Fox, assistant director of the Delta substation, and has been appointed director of farmers' institutes, and professor of animal husbandry. J. A. McLean has resigned as animal husbandman of the station and is suc-

ceeded by E. R. Lloyd, formerly director of farmers' institutes. Archibald Smith, professor of animal husbandry, has been placed in charge of the Delta substation.

Missouri University and Station.—The night school of agriculture held by the university at Kansas City in cooperation with the Frisco Lines, was attended by over 600 persons. The attendance at a similar school in St. Louis was over 1,800. Including these two night schools and three special trains, the faculty of the college of agriculture addressed over 40,000 persons during one month.

F. W. Woodman resigned March 1 as research assistant in chemistry to accept a commercial position in Pennsylvania, and has been succeeded by A. A. Jones, who has been assistant in agricultural chemistry. Other recent appointments include Dr. Leonard Haseman, of Cornell University, as instructor in entomology, G. C. White, a senior student in the college of agriculture, as assistant in dairy husbandry, and J. C. Hackleman, of Purdue University, as assistant in agronomy. C. R. Moulton has been promoted to the instructorship in agricultural chemistry, and L. G. Rinkle to that in dairy husbandry.

Nebraska University and Station.—L. W. Chase, of the department of agricultural engineering in the college of agriculture, has been added to the station council, with the title of agricultural engineer, and is conducting investigations in farm drainage and sanitation and the use of cement for farm purposes.

The new substations located at Mitchell and Valentine are being equipped. The Mitchell substation is to give special attention to work in irrigation and dry-land agriculture, and will be conducted in cooperation with the Bureau of Plant Industry of this Department. The land and a portion of the improvements have been furnished by the United States Reclamation Service, and Fritz Knorr has been appointed superintendent. The Valentine substantion is to investigate the crops and agricultural methods adapted to the sand-hill region of the State. James Cowan has been appointed superintendent of this substation.

New Jersey State Station.—Miner S. Macomber, a graduate of the Rhode Island College, has been appointed assistant chemist in connection with the fertilizer and feed inspection.

New Mexico College and Station.—A. P. Bjerregaard, assistant in chemistry, resigned February 1.

Cornell University.—Bills have passed the legislature granting $113,000 for a general class room and auditorium building, $90,000 for a poultry building, and $154,000 for a home economics building.

North Dakota College and Station.—W. C. Palmer, dean of agriculture at Winona College, has been appointed agricultural editor in the department of college extension, and A. McMeans, of the Ontario Agricultural College, has been appointed assistant in horticulture. G. A. Abbott, assistant professor of organic chemistry in the college, has accepted an appointment as head of the chemical department at the University of North Dakota, and has been succeeded by E. E. Ware, assistant professor of industrial chemistry at the University of Michigan. A. F. Schalk, of the Bureau of Animal Industry of this Department, has been appointed professor of comparative physiology in the veterinary college and has entered upon his duties, which will include both instruction and experimental work.

Plans have been accepted for the new chemistry building, a seed house at the Dickinson substation to cost $3,500, and a residence at the Hettinger substation. An enlargement of the sheep barns has been authorized.

The plant-breeding work is to be enlarged and extended. A centgener planter has recently been procured for use in the work. The veterinary department is preparing to distribute hog-cholera serum. Extensive poultry experiments are

under way, especially of factors influencing egg production under North Dakota conditions.

Ohio Station.—The appropriations made by the general assembly to the station for the ensuing year aggregate $166,295, an increase of nearly $50,000 over the previous year. Some of the principal items are $26,300 for administration, $16,475 for agronomy, $15,000 for animal husbandry, $10,900 for botany, $20,470 for cooperative experiments, $5,000 for entomology, $10,000 for forestry, $10,500 for soils, $3,700 for chemistry, $10,950 for horticulture, $4,000 for nutrition, $17,000 for completing the nutrition building, $3,000 for the extension of the power house, and $4,000 for the purchase of land.

The assembly also authorized the establishment of a department of dairy husbandry, and appropriated $8,000 for its support. Among the lines of investigation which are contemplated are the production of dairy stock, including breeding and feeding, conformation as related to dairy function, utilization of food, the effect of special foods, especially those deficient in phosphorus, upon the production and general health of the animal, the quality of the milk, and the birth weight and vigor of offspring, and the pathology of the dairy with special reference to tuberculosis. The present dairy herd, buildings and equipment, and a portion of the station pastures, are to be transferred to the new department. It is expected that the pathological work will eventually be organized as a separate department.

Under an act signed by the governor April 23, the commissioners of each county of the State are required, upon petition of 200 or more of the taxpayers, to submit to a vote a project for establishing a demonstration farm. If this is authorized a tax not to exceed one-fifth mill for any one year may be levied for its equipment and support. The station is to cooperate in the selection of sites and the conducting of experiments.

Oklahoma College and Station.—The resignations are noted of L. A. Moorhouse as agronomist, W. L. Burlison as assistant agronomist, W. R. Wright as assistant bacteriologist, O. M. Morris, horticulturist and botanist, H. P. Miller, principal of the school of agriculture, and three members of the clerical force of the station.

Rhode Island Station.—The station is just completing a hospital building for use in connection with the investigation concerning the diseases of poultry and methods for their control.

Clemson College.—W. R. Perkins, agronomist of the Mississippi Station, has been appointed director of the agricultural department.

Texas Station.—W. C. Welborn has resigned as vice director and agriculturist.

Vermont University and Station.—A better-farming special train was run on the Rutland Division of the New York Central Lines in the State, April 12 to 15, in cooperation with the agricultural department of the university, the state commissioner of agriculture, and the state forester. It is estimated that about 5,500 people visited the train.

H. A. Edson, for nearly four years assistant botanist and later bacteriologist of the station and instructor in bacteriology in the university, will enter the employ of the Bureau of Plant Industry of this Department June 1. J. W. Wellington, assistant horticulturist of the station, has accepted a position with the Indiana Station, to take effect July 1.

Washington College and Station.—Leonard Hegnauer, assistant in crop production at the Illinois University and Station, has been appointed professor of agronomy in the college and agronomist in the station, beginning June 1. Robert C. Ashby, adjunct professor of animal husbandry at the University of Nebraska, has been appointed assistant superintendent of farmers' institutes and entered

upon his duties May 1. M. A. Yothers, assistant entomologist of the Michigan College and Station, has been appointed assistant entomologist in the station and began work April 1. Ira P. Whitney, instructor in dairying in the college, has resigned to engage in commercial work.

Wisconsin University.—Eric W. Miller, of the Weather Bureau station at Madison, has been appointed lecturer in meteorology. Recent promotions include as associate professors, E. V. McCollum in agricultural chemistry, and J. G. Moore in horticulture; and as assistant professors, W. E. Tottingham in agricultural chemistry, O. J. Delwiche and A. L. Stone in agronomy, and G. H. Benkendorf in dairy husbandry.

Summer Schools of Agriculture.—Of the large number of institutions which are to hold summer courses in agriculture and related subjects this year, announcements are available for the following: At the Connecticut Agricultural College, July 5–29, in cooperation with the Willimantic State Normal School; at the University of Illinois, beginning June 20, six weeks' and nine weeks' courses for teachers; at the Kansas State Agricultural College, beginning June 14, six weeks' courses primarily for teachers; at the Western Kentucky State Normal School, Bowling Green, June 14 to July 22; at the Massachusetts Agricultural College in bee keeping, May 25 to June 8, and a large number of courses especially for teachers, clergymen, and others, July 11 to August 12; at the University of Minnesota, June 20 to July 29, elementary courses primarily for teachers; at the North Carolina College of Agriculture and Mechanic Arts, May 16–28, in nature study and agriculture for rural teachers; at the North Dakota Agricultural College, June 6 to July 22, in traction engineering; at the State Normal School, Valley City, N. Dak., July 19 to August 27; at the Oregon State Agricultural College, from June 20 to August 6; at the Rhode Island College, July 11–23; at the South Dakota State College of Agriculture and Mechanic Arts, from June 22 to July 13; at the University of Tennessee, from June 21 to July 29; at the Texas Agricultural and Mechanical College, from June 20 to July 29; at the University of Texas, from June 18 to August 4; at the North Texas State Normal College, Denton, Tex., for eight weeks, beginning June 1; at Baylor University, Waco, Tex., from June 27 to August 19; at Hampton Normal and Agricultural Institute, from June 14 to July 12; at the State College of Washington, June 20 to July 29; and at the University of Wisconsin, from June 27 to August 6.

A Standard Course in Forestry.—The *Forestry Quarterly* for March states that at a conference of forest schools held in Washington, D. C., on December 30–31, 1909, 15 universities and colleges giving instruction in forestry were represented. A committee, consisting of Forester H. S. Graves, of Professors Fernow, Roth, and Fisher, and of Gifford Pinchot, reported to the conference a plan for establishing a minimum standard curriculum in forestry and looking toward the permanent organization of a forest conference. This report was adopted and the committee continued, with power to call a meeting of such a conference and to formulate a constitution for the proposed association, and, in consultation with the Forest Service and other employers of foresters, to prepare a standard of forest education.

Opening of New School of Agriculture Building at Cambridge University.—The new building of the school of agriculture at Cambridge University was formally opened April 26 by the Duke of Devonshire. The building is an imposing three-story structure in addition to the basement and attic, and contains three lecture rooms, two large elementary laboratories for chemistry and botany, smaller rooms for private research, and a library and offices. The cost of the building was about $100,000. It was designed to accommodate one hundred students, but is already barely adequate for the needs of the work.

Secondary Agricultural Schools in Arkansas.—The four district agricultural schools provided for by the Arkansas legislature have been located as follows: First district, Jonesboro, second district, Russellville, third district, Magnolia, fourth district, Monticello. The Russellville school will open in the fall of 1910, with A. K. Short, formerly animal husbandman of the Arkansas College and Station, in charge as principal.

The legislature has appropriated $350,000 for the equipment of these schools, and it is hoped to augment this materially by contributions from the localities in which the schools are to be located.

Morrill Centennial Exercises.—Memorial exercises in honor of the one hundredth anniversary of the birth of Hon. Justin S. Morrill were held April 14 at Montpelier, Vt. The principal eulogy was delivered by President M. H. Buckham, of the University of Vermont. In this tribute President Buckham dwelt especially on Senator Morrill's work in connection with the founding and endowment of the land-grant colleges, characterizing this as the last and greatest of his public measures.

Federal Insecticide and Fungicide Law.—Under an act signed by President Taft April 26, the manufacture, sale, or transportation in interstate commerce, the District of Columbia, or the Territories, of adulterated or misbranded Paris green, lead arsenate, and other insecticides and fungicides is prohibited after January 1, 1911, at which time the act goes into effect.

The law corresponds in a general way to the federal food and drugs act of 1906. Rules and regulations for its enforcement are to be formulated by the Secretary of the Treasury, the Secretary of Agriculture, and the Secretary of Commerce and Labor, but definitions and standards are adopted for most of the principal products dealt with. Violations of the law constitute a misdemeanor, and are punishable by a fine or imprisonment or both. The analytical work is to be under the direction and supervision of the Bureau of Chemistry of this Department.

Necrology.—J. S. Newman, one of the pioneer workers for southern agricultural advancement and identified with its interests for nearly thirty years, died May 11, at Walhalla, S. C., at the age of 74 years.

Professor Newman was born in Orange County, Va., in 1836, and was graduated from the University of Virginia in 1859. He served in the Confederate Army during the greater part of the civil war, and at its close engaged in farming in Virginia and Georgia, and taught a private school until 1875. In that year he became secretary of the Georgia Department of Agriculture, continuing in this position for eight years.

In 1883 he was elected to the chair of agriculture in the Alabama Polytechnic Institute. Upon the establishment of the experiment station he was also made director of the Alabama Station, and in this capacity organized and exercised general supervision over its substations. He also organized the state agricultural society, and served as its president for a number of years, and was state statistical agent of this Department in connection with the crop reporting service. In 1892 he accepted his final position at Clemson College as professor of agriculture and vice director of the station, and with the exception of a period from 1894 to 1897 spent in farming, continued in that capacity until 1905, when he accepted a pension from the Carnegie Foundation and retired to private life.

Professor Newman was married in 1863. Among his five children are Clifford L. Newman, professor of agriculture at the North Carolina College, and Charles C. Newman, horticulturist at the South Carolina Station.

During his long career, Professor Newman was a frequent speaker at farmers' institutes, agricultural societies and other farmers' gatherings in

Virginia, Georgia, Alabama, and South Carolina. He was also a prolific writer, preparing a large number of bulletins, chiefly in connection with his experiments with field crops, as well as several manuals on general agriculture, sheep, poultry, cattle, and hog raising, and southern horticulture. For many years he was a valued contributor to the leading agricultural journals of the South.

In the words of his long-time friend and associate, ex-President P. H. Mell, of Clemson College: "In his death the South has lost a distinguished man, who devoted his energies unselfishly to the upbuilding of his country. The farmers will miss his wise counsels, for they have lost a friend who was deeply concerned in their welfare. His best work was done in Georgia, although Alabama and South Carolina can well claim much of the valuable results of his busy life. He was a progressive agriculturist, who believed in making the soil produce its best under the most intelligent cultivation by scientific and well directed systems. He at all times taught the farmers that the land should be made to produce all crops possible for home consumption, and they should depart from the old method of making cotton the one-market crop. He taught by precept and example the value of deep ploughing and thorough cultivation. Some of his practical experiments before the farmers' institutes in the early days on the relationship of the plant roots to the soil were intensely interesting, and of great assistance to the farmer in intelligently understanding the economy of plant growth. His fund of agricultural knowledge and extensive practical experience made him a past grand master in the orchard, the vegetable garden, and in the field. He could make plants grow in soils where other men would fail, because he was so familiar with the constitution of the soil and its capabilities.

"The agricultural workers in the experiment stations of the future will miss his contributions to the sciences, but he has left so much in print the country is greatly enriched by the work of his pen."

Charles F. Wheeler, an expert in botany in the Bureau of Plant Industry of this Department, died March 5, aged 68 years. Professor Wheeler was graduated from the Michigan Agricultural College in 1891. For about 10 years he served as assistant professor of botany in that institution, and for much of that time he was botanist or consulting botanist for the Michigan Station.

Dr. O. Böttcher, from 1884 to 1909 assistant in the Royal Agricultural Experiment Station at Möckern, and since 1893 its vice director, died February 2, 1910, at the age of 53 years.

Miscellaneous.—On April 16 an agricultural conference was held at Bryn Mawr College to consider the opportunities open to women for earning a livelihood in general farming, truck gardening, stock raising, poultry raising, fruit-tree nurseries, hothouse floriculture, bee keeping, and landscape gardening.

A recent issue of *Science* states that Columbia University has received $15,000 from an anonymous source for agricultural education.

The fifth National Dairy Show will be held Ocober 14–22, 1910. H. E. Van Norman, of the Pennsylvania College and Station, will continue to serve as secretary and manager.

B. N. Wale, senior lecturer in agriculture in Southeastern College, has been appointed principal of Seale-Hayne Agricultural College, in Devonshire.

Dr. Giovanni Raineri has succeeded F. Cocco-Ortu as Minister of Agriculture, Industry and Commerce of Italy.

Dr. G. Loporiore has been appointed director of the agricultural station at Modena, Italy.

EXPERIMENT STATION RECORD.

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NOTE.—The publications of the United States Department of Agriculture may be purchased from the Superintendent of Documents, Washington, D. C., to whom all remittances should be made. The price of *Experiment Station Record* is $1 per volume, and there will be two volumes each year. The prices of other technical publications are given above. The publications of the state experiment stations are distributed from the stations and not from the Department.

EXPERIMENT STATION RECORD.

VOL. XXII. ABSTRACT NUMBER. No. 8.

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

The crystallography of hemoglobins, E. T. REICHERT and A. P. BROWN (*Carnegie Inst., Washington Pub. 116, pp. XIX+338, pls. 100, figs. 411*).—The elaborate and extended investigations here reported were undertaken in a study of the differentiation and specificity of corresponding proteins and other vital substances in relation to biological classification and organic evolution.

The several chapters have to do with the distribution of hemoglobin and allied substances in the animal kingdom; specificity of the blood of vertebrates in relation to zoological distinction; the general chemical and physical characters of hemoglobin, and its specificities; the preparation and crystallography of hemoglobins; the methods employed in the present research for preparing, examining, and measuring crystals of hemoglobins; and the results of studies of the crystallography of the hemoglobins from the different types of the animal kingdom.

The present research was begun "upon the hypothesis that if it should be found that corresponding vital substances are not identical, the alterations in one would doubtless be associated with related changes in others, and that if definite relationships could be shown to exist between these differences and peculiarities of the living organism, a fundamental principle of the utmost importance would be established in the explanation of heredity, mutations, the influences of food and environment, the differentiation of sex, and other great problems of biology, normal and pathological.

"To what extent this hypothesis is well founded may be judged from this partial report of the results of our investigations: It has been conclusively shown not only that corresponding hemoglobins are not identical, but also that their peculiarities are of positive generic specificity, and even much more sensitive in their differentiations than the 'zooprecipitin test.' Moreover, it has been found that one can with some certainty predict by these peculiarities, without previous knowledge of the species from which the hemoglobins were derived, whether or not interbreeding is probable or possible, and also certain characteristics of habit, etc., as will be seen by the context. The question of interbreeding has, for instance, seemed perfectly clear in the case of Canidæ and Muridæ, and no difficulty was experienced in forecasting similarities and dissimilarities of habit in Sciuridæ, Muridæ, Felidæ, etc., not because hemoglobin is per se the determining factor, but because, accordng to this hypothesis, it

serves as an index (gross though it be, with our present very limited knowledge) of those physico-chemical properties which serve directly or indirectly to differentiate genera, species, and individuals. In other words, vital peculiarities may be resolved to a physico-chemical basis."

On the biochemistry of nucleic acids, P. A. LEVENE (*Jour. Amer. Chem. Soc., 32 (1910), No. 2, pp. 231–240*).—In this paper the author presents a summary and digest of data on the elementary composition of nucleic acids, their constitution, and related questions.

The biochemical rôle of bacteria, A. HOROWITZ-WLASSOWA (*Arch. Sci. Biol. [St. Petersb.], 15 (1910), No. 1, pp. 40–58*).—Experiments are reported and discussed on the bacterial cleavage of protein.

A critical study of the natural changes occurring in fats and oils, J. S. HEPBURN (*Jour. Franklin Inst., 168 (1909), Nos. 5, pp. 365–384; 6, pp. 421–456; 169 (1910), No. 1, pp. 23–54*).—This is a review of the various researches which have been made in regard to the natural changes occurring in oils and fats.

Action of nitric acid on starch, A. G. DOROSHEVSKI, A. V. RAKOVSKI, and A. Y. BARDTE (*Zhur. Russ. Fiz. Khim. Obshch., Chast Khim., 40 (1908), No. 5, pt. 1, pp. 932–940, fig. 1; abs. in Bul. Soc. Chim. France, 4. ser., 8 (1910), No. 2, p. 89*).—Studies were made in regard to the inversion of starch by 8, 6, and 14 per cent strengths of nitric acid, and from the results it is evident that the reaction is increased in the same ratio as the concentration. The studies were made with starches from different sources, and which the author divides into 2 groups, group 1 containing the starches of potato, and the Bermuda and St. Vincent arrowroot, and group 2 the starches of rice and wheat.

Vicianose, G. BERTRAND and G. WEISWEILLER (*Compt. Rend. Acad. Sci. [Paris], 150 (1910), No. 3, pp. 180–182*).—This is a new biose reducing sugar obtained by acting upon vicianin with a diastase obtained from the seeds of *Vicia angustifolia*. It is the first biose prepared by diastatic hydrolysis of a glucosid. See also a previous note (E. S. R., 19, p. 129.).

Investigations in regard to rennet action, HÖFT (*Arb. Vers. Stat. Molkw. Kiel, 1909, No. 6, pp. 20–25; abs. in Centbl. Bakt. [etc.], 2. Abt., 24 (1909), No. 16–17, p. 460*).—It was found that spontaneously and artificially acidified milks have about the same coagulation time. Neither the reduction of acidity to a small amount with the aid of potassium hydrate nor acidifying to a medium strong degree had any marked influence on the coagulation time. For whole milk and skim milk of the same origin it was shown that on the average the skim milk with a small degree of acidity had only a slightly slower coagulation time than the whole milk. It is recommended in testing milks in this regard to bring the different milks to the same degree of acidity.

Differentiation of rennet coagulum from that produced by acid, HÖFT (*Arb. Vers. Stat. Molkw. Kiel, 1909, No. 6, pp. 12–19; abs. in Centbl. Bakt. [etc.], 2. Abt., 24 (1909), No. 16–17, p. 460*).—Rennet coagulum can be easily differentiated from acid coagulum by comparing the ash content of the fat-free dry substance. The rennet coagulum yields 8 to 10 per cent of ash, while that from the acid has only from 4 to 6 per cent. Further, the calcium content of the rennet coagulum is about 3 per cent, while that obtained from the fat-free dry substance of the acid coagulum is only about 1 per cent.

If the coagulation of milk is brought about by the combined action of acid and rennet the coagulum shows evidences of a transition between the acid and rennet coagulum. The temperature, also, has possibly some influence on the ultimate composition of the ash. Determining the degree of acidity of the two coagulates furnishes no definite idea as to their origin, particularly where the estimation is not carried out directly after coagulation.

The newer work on bacterial fermentation, O. Emmerling (*Biochem. Centbl., 9 (1909), No. 9–10, pp. 397–417*).—A retrospect of the newer work in fermentation bacteriology, including the bacterial fermentation of milk, slimy fermentations, etc.

Ferments and their actions, C. Oppenheimer (*Die Fermente und ihre Wirkungen. Leipsic, 1909, 3. ed., pp. XI+491*).—This is a "special part" of the third revised edition on the functions of enzyms. The author has grouped the material under the headings hydrolases, oxydases, zymases, and katalase. He states that the material included has been thoroughly revised and that the present work will be supplemented by a volume discussing enzyms in general.

The oxidases, J. H. Kastle (*Pub. Health and Mar. Hosp. Serv. U. S., Hyg. Lab. Bul. 59, pp. 164*).—This is a compilation of the literature and a discussion of most of the more important work pertaining to the oxidases and other oxygen catalysts which are concerned in biological oxidations.

About the presence of a catalase and an anaeroxydase in cow's milk, J. Sarthou (*Compt. Rend. Acad. Sci. [Paris], 150 (1910), No. 2, pp. 119–121*).—A reply to Bordas and Touplain (E. S. R., 22, p. 514).

The intracellular enzyms of Penicillium and Aspergillus, with special reference to those of Penicillium camemberti, A. W. Dox (*Connecticut Storrs Sta. Rpt. 1908–9, pp. 375–453; U. S. Dept. Agr., Bur. Anim. Indus. Bul. 120, pp. 70*).—This work has already been noted from another source (E. S. R., 21, p. 609) but the present publications have a much more extensive discussion of previous investigations and present additional details.

The nuclein ferments of yeasts, M. N. Straughn and W. Jones (*Jour. Biol. Chem., 6 (1909), No. 3, pp. 245–255; abs. in Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. ser., 4 (1909), No. 19, p. 744*).—The authors conclude that guanase is the only nuclein ferment present in yeast.

The bluing of press yeast, A. Baron (*Brennerei Ztg., 1909, pp. 5141, 5149; abs. in Chem. Ztg., 34 (1910), No. 10, Repert., p. 43*).—The author attributes the coloration to the agency of the oxygen of the air and considers it a physiological process which is going on in yeast cells which are free from glycogen and with the ultimate formation of a compound which is designated "yeast hemoglobin." If the yeast cells are cultivated or placed in a sugar solution for ½ hour this coloration disappears.

The stimulation of premature ripening by chemical means, A. E. Vinson (*Jour. Amer. Chem. Soc., 32 (1910), No. 2, pp. 208–212*).—In a fuller account of work previously noted (E. S. R., 22, p. 209) the author records the effect of a large number of chemical substances on the ripening of dates, such stimulation being obtained with a very considerable proportion of the materials used.

Quotations from the author's discussion of the subject follow:

"From the diversity of these reagents it is evident that the effects observed can not be due to any particular chemical structure, nor do many of them react chemically with any known constituent of the date. Furthermore, after treatment over night with acetic acid vapor, an appreciable reaction for invertase could be obtained in the glycerol extract although a marked astringency was still present. From these facts and previous work on the intracellular invertase of the date, including some recent observations on the chemical organization of the green fruit while it retained its physical integrity, it was concluded that this apparent stimulation of ripening depended solely on the killing of the protoplasm. In broad terms, any substance which will penetrate the cuticle and kill or stimulate the protoplasm, thereby releasing the previously insoluble intracellular enzyms without rendering them inactive, will bring about ripening, provided the fruits have reached a certain necessary degree of maturity. . . .

"The more immature fruits heated to 70° for 10 minutes or longer darkened nicely but remained astringent. At higher temperatures even the more mature fruits remained permanently astringent while untreated immature fruits gradually lost their astringency. These facts can be explained only as the direct or indirect action of some specific enzym that is destroyed at about 70°. Hydrazine hydrochlorid interfered with the general trend of ripening but the astringency disappeared.

"Commercially, many varieties of dates may be ripened rapidly after they have reached a certain degree of maturity. Before that time they do not contain sufficient dry matter to make a palatable fruit. Many varieties so ripened are fully equal to the natural product. This may be accomplished by exposing them to the vapors of a great many substances, but only a few are commercially practical, due to the bad flavors which most of them impart. Fruit of good flavor was obtained by treatment with the vapors of acetic and propionic acids, ethyl chlorid, ethyl bromid, ethylene chlorid, methylene chlorid and chloroform, and with solutions of lactic, benzoic and salicylic acids and some other substances of more or less poisonous nature. Gasoline, benzene, esters of organic acids, ordinary ether, acetone, volatile oils, and most other substances leave permanent disagreeable flavors.

"Deglet Noor dates do not yield satisfactorily to these methods but can be made palatable and, if sufficiently mature, will yield fruit of fair quality when subjected to the judicious use of ethyl nitrite vapor. A small amount of this reagent ($\frac{1}{4}$ to $\frac{1}{2}$ cc. of 20 per cent solution for every 1,000 cc. of space inclosed) will finally render the tannin insoluble without discoloring the date badly or imparting any noticeable flavor.

"It is anticipated that the application of these methods will prevent much of the enormous loss from souring which is experienced at present during unfavorable weather. Artificially ripened dates do not sour so readily as the fruit ripened on the tree and remain much freer from insects."

Concerning the after-ripening of fruits, R. OTTO and W. D. KOOPER (*Ztschr. Untersuch. Nahr. u. Genussmtl., 19 (1910), No. 1, pp. 10–13; abs. in Biochem. Centbl., 9 (1910), No. 18–19, p. 830*).—Investigations with the sloeberry (*Prunus spinosa*) show that the total sugar content of the dry substance increases very little, but does so at the expense of the glucose and results in a rise in the fructose content. The acid and tannin decrease about in the same proportion, but this decrease is greater than the increase in the total sugar content. The authors, therefore, conclude that there is no ground for the belief that the after ripening is brought about with the production of sugar at the expense of the other substances present. Furthermore, it is explained that the diminution in the astringency is due to the decrease in the acid and tannin.

Postripening of fruits, R. OTTO and W. D. KOOPER (*Ztschr. Untersuch. Nahr. u. Genussmtl., 19 (1910), No. 6, pp. 328–330*).—Further investigations with other fruits, the Japanese quince (*Cydonia japonica*) and the medlar (*Mispelus germanica*), showed that with the latter a decided decrease in the sugar took place simultaneously with the decrease in the acid and nitrogen content. With the Japanese quince in the second stage of ripening a decrease in the sugar was also apparent, but the tannin and acid decreases were slight. In the third stage, however, a marked fall in the water, sugar, tannin, and acid content took place.

The chemical novelties for 1909, C. POULENC (*Les Nouveautés Chimiques pour 1909. Paris, 1909, pp. VIII+336, figs. 172*).—A condensed description of new or modified chemical apparatus and methods brought out in the year 1909. The apparatus included is physico-chemical, analytical, general industrial, food,

and medical. A chapter is also given in reference to recent bacteriological apparatus.

An iodimetric determination of phosphorus, P. ARTMANN (*Ztschr. Analyt. Chem., 49 (1910), No. 1, pp. 1–25*).—After considering the acidimetric, oxydimetric, and precipitation methods, the author recommends the following iodimetric method for phosphorus determination in phosphates:

One gm. of the substance is dissolved in about 30 cc. of water containing 8 to 10 cc. of nitric acid (density 12), and heated up to the boiling point, from 2 to 3 cc. of 1 : 1 hydrochloric acid being added during the process. If sulphates are present these are precipitated at the boiling point with barium nitrate. The flask is then filled to the 250 cc. mark and filtered. Twenty-five cc. of the filtrate is taken for the actual determination, there being added to it 4 gm. of ammonium nitrate and 2 cc. of nitric acid, the mixture heated to 40° C., and 12 to 15 cc. of ammonium molybdate solution (previously heated up to 40°) added dropwise. The mixture is then stirred for 5 minutes at 40°, and after a lapse of 15 minutes 5 cc. more of the molybdate solution is added. After heating at a temperature of 40° to 45° for from ¾ to 1 hour, the solution is decanted and filtered through a hardened 6 cm. filter with the aid of a filter pump and wash water at 14°. The decantation is continued until 5 drops of the filtrate give no definite brown coloration with potassium ferrocyanid.

The precipitate which has been carried over on the filter is dissolved in one-half normal sodium hydrate and washed into the original beaker with water, the washing being continued as long as an odor of ammonium hydrate is apparent. The precipitate which has remained in the beaker after the decanting process is dissolved by the aid of from 4 to 5 cc. of double normal sodium hydrate solution. To the solution is added 20 cc. of an alkaline bromin solution which has been previously compared with thiosulphate, from 8 to 10 gm. of sodium hydrogen phosphate, and finally 1.5 gm. of potassium iodid. This is acidified with 15 cc. fourth-normal sulphuric acid and titrated back with tenth-normal sodium thiosulphate. For calculating the results the following formula is used: $x=\frac{a(b-c)}{0.016088.d}$. In this, a=grams of iodin for 1 cc. of sodium thiosulphate solution, b=the number of cubic centimeters of sodium thiosulphate which represents 20 cc. of the alkaline bromin solution, c=the number of cubic centimeters of tenth-normal thiosulphate employed to titrate back, d=the amount of the original substance taken in grams, and x=the percentage of phosphoric acid.

The alkaline bromin solution is prepared by carefully adding 15 cc. of bromin to 1 liter of normal sodium hydroxid solution amid stirring, keeping the sodium hydroxid surrounded by ice water during the addition. The solution is diluted once with water upon use. The author in a later work will report on the application of the method to fertilizer and iron analyses.

Determination of hypophosphoric, phosphorous, and hypophosphorous acids in the presence of each other and phosphoric acid, A. ROSENHEIM and J. PINSKER (*Ztschr. Anorgan. Chem., 64 (1909), No. 4, pp. 327–341; abs. in Jour. Soc. Chem. Indus., 28 (1909), No. 24, p. 1312*).—Hypophosphoric acid may be titrated accurately with potassium permanganate solution, and further, reacts quantitatively with uranyl nitrate, gives a yellow precipitate with it, and is not affected by heating the iodin solution. Phosphorous and hypophosphorous acids are oxidized by both iodin and potassium permanganate, but give no precipitate with uranyl nitrate.

The authors on this basis propose the following scheme for determining these acids in the presence of each other: (a) Hypophosphates and phosphites or hypophosphites—titration with uranyl nitrate is followed by the oxidation with standard potassium permanganate solution. (b) Phosphites and hypophosphites—the acids are oxidized with either standard potassium permanganate or iodin and the total phosphate produced by oxidizing with nitric acid is determined. (c) Hypophosphates, phosphites, and hypophosphites—the hypophosphate is estimated with uranyl nitrate and the remaining acids identified as described in (b). (d) Phosphates, hypophosphates, phosphites and hypophosphites—the total phosphorus is estimated as phosphates after oxidizing with nitric acid. The remaining acids are oxidized in another portion with standard potassium permanganate solution. In still another portion of the solution the phosphites and hypophosphites are oxidized with iodin solution, while the fourth portion serves for titration with uranyl nitrate solution. In calculating the results, if x, y, z, and t represent the quantities of the respective acids, $x=\frac{2l+2k-n}{2a_1}$, $y=\frac{n-2k}{a_2}$, $z=\frac{k+2m-2l-n}{a_3}$, and $t=\frac{2l+n-2m}{2a_4}$, where $a_1=1/H_3PO_4$, $a_2=1/H_2PO_3$, $a_3=1/H_3PO_3$, $a_4=1/H_3PO_2$, $m=2g_1/Mg_2P_2O_7$ (g_1=weight of magnesium pyrophosphate obtained), $n=5g_2/KMnO_4$ (g_2=weight of permanganate required), $k=g_3/2I$ (g_3=weight of iodin required), and $l=qS/P_2O_5$ (S=cubic centimeters of uranyl nitrate solution used; 1 cc.=q gm. of phosphoric oxid).

In making the potassium permanganate oxidation, an approximately decinormal solution of the salt is slightly acidified with sulphuric acid, a few cubic centimeters of decinormal potassium permanganate added, and the mixture heated to 80° or 90° C. If a red color remains this is to be removed by titrating with acid solution, then adding potassium permanganate, repeating the titration with oxalic acid, adding the potassium permanganate in decreasing amounts until the oxidation is complete. In oxidizing the iodin a 10 per cent solution of hydrochloric acid and a known volume of twentieth-normal iodin solution is taken for a measured amount of the original liquid, and the mixture heated for from 2 to 3 hours on the water bath in a closed flask. After allowing it to stand for several hours, the excess of iodin is finally titrated with thiosulphate in the presence of sodium bicarbonate.

Analysis of double superphosphates, O. FOESTER (*Chem. Ztg.*, *33* (*1909*), *No. 75, pp. 685, 686; abs. in Ztschr. Analyt. Chem.*, *49* (*1910*), *No. 1, pp. 61, 62*).—It has been shown that the method of preparing the double superphosphate solution has some influence on the results for water soluble phosphoric acid. The experiment stations at Berlin and Breslau recommend the following procedure:

Twenty gm. of the well-mixed but not powdered double superphosphate is placed in a mortar, rubbed up with the least possible amount of water, and the aqueous portion poured into a liter flask. This operation is repeated several times, when the residue is also placed in the flask which is finally filled to the mark with water. The solution is allowed to stand for 24 hours (shaking occasionally in the interval). After filtering the solution 25 cc. of the filtrate is taken and to it are added 10 cc. of fuming nitric acid, boiled for 10 minutes, neutralized exactly with ammonia (using an indicator), and after cooling, precipitated with 50 cc. of Maercker's ammonium citrate solution and 25 cc. of magnesium mixture. The mixture is stirred 30 minutes in the stirring apparatus.

For determining the moisture in double superphosphates 5 gm. of the substance is dried for 6 hours at 100° C.

The reduction of nitric nitrogen to ammonia and a new method for determining nitrates, M. E. POZZI-ESCOT (*Ann. Chim. Analyt.*, *14* (*1909*), *No. 12*,

pp. 445, 446).—The method is as follows: Place the substance in a distilling flask which has a thistle tube attached, and add from 5 to 6 gm. of fine aluminum filings, 2 cc. of a saturated solution of mercuric chlorid, and from 150 to 200 cc. of water. Shake the mixture and connect the flask with the distilling apparatus. A preliminary reaction takes place in which an abundance of hydrogen is liberated. After the reaction is almost over add a few drops of potassium hydroxid through the thistle tube, distill, and collect the distillate in a titrated acid solution.

The effect of chlorids on the estimation of nitrates in water, A. Sabatini (*Ann. Chim. Analyt., 14* (*1909*), *No. 10, pp. 366, 367; abs. in Jour. Chem. Soc.* [*London*], *96* (*1909*), *No. 565, II, p. 935*).—The author is satisfied that Perrier and Farcy's views on Grandval and Lajoux's method (E. S. R., 21, p. 8) are correct, and suggests the following procedure: Twenty gm. of silver oxid is added to from 50 to 60 cc. of water, allowed to stand for 2 hours (shaking several times in the interval), and the liquid filtered free from chlorid. The filtrate is then examined colorimetrically for nitrates.

A new nitrite method, A. Sanin (*Zhur. Russ. Fiz. Khim. Obshch., Chast Khim., 41* (*1909*), *No. 6, pt. 1, pp. 791–795; abs. in Chem. Zentbl., 1909, II, No. 20, p. 1773; Jour. Chem. Soc.* [*London*], *96* (*1909*), *No. 565, II, p. 935*).—The author criticises the existing methods and proposes a method which is based on the following reaction: $NaNO_2+NH_3O.HCl=NaCl+N_2O+2H_2O$. In this method the solution of hydroxylamin-hydrochlorid is titrated for acid before and after conversion by sodium hydrate. The difference between the two figures represents the amount of hydrochloric acid which was used for converting the nitrite. The indicator employed is phenolphthalein.

Detection of sodium sulphite in the presence of sodium sulphate and sodium thiosulphate, F. E. Weston (*Chem. News, 100* (*1909*), *No. 2602, p. 176; abs. in Jour. Chem. Soc.* [*London*], *96* (*1909*), *No. 565, II, p. 934*).—To 5 cc. of a 5 per cent solution decinormal iodin solution is added. If this solution is decolorized sulphite or thiosulphate, or both are present. The addition of iodin is continued until a faint coloration sets in, when the liquid is examined as to acidity. If acid, sulphite is probably present.

To another 5 cc. of the original solution is added one-half the amount of iodin required in the first test, when sulphur dioxid may be recognized by its odor and also by its reduction of potassium bichromate. If sulphur dioxid is evolved, sulphite is present. If no reduction of potassium bichromate takes place and there is an absence of a green color, thiosulphate is indicated. The sodium sulphate can be detected with barium chlorid in the usual manner.

Determining the barium sulphate in presence of bodies that interfere, M. J. Van't Kruijs (*Chem. Weekbl., 6* (*1909*), *No. 39, pp. 735–758; abs. in Jour. Chem. Soc.* [*London*], *96* (*1909*), *No. 565, II, p. 939*).—The method has reference to the fact that where much calcium is present the resulting barium sulphate precipitate, although free from potassium, sodium, magnesium, iron, and cobalt, will also contain an appreciable amount of calcium sulphate. By its use the precipitated calcium is easily removed and perfectly pure barium sulphate is left.

Detection of hydrogen fluorid in the presence of fluorid salts, W. Cronheim (*Biochem. Ztschr., 23* (*1909*), *No. 1–2, pp. 143–145*).—The author proposes a method which is based on the fact that hydrofluoric acid is soluble in ether and alcohol, while the flourid salts are not.

The determination of benzoic and cinnamic acids in a mixture of the two acids, A. W. K. De Jong (*Rec. Trav. Chim. Pays-Bas et Belg., 28* (*1909*), *No. 5–6, pp. 342–348*).—A study of methods.

The methods of lecithin determination, J. NERKING (*Biochem. Ztschr., 23 (1909), No. 3-4, pp. 262-269*).—The author finds that adding a solution of magnesium chlorid to lecithin in ether brings about a quantitative separation when the lecithins are precipitated by acetone.

About the use of hydrogen peroxid in oxydase tests, T. KIKKOJI and C. NEUBERG (*Biochem. Ztschr., 20 (1909), No. 6, pp. 523-525; abs. in Chem. Zentbl., 1909, II, No. 19, p. 1670*).—Hydrogen peroxid and ferrous sulphate are often used for testing for oxydases. It was noticed that the peroxid in presence of iron salts at times reacts with certain aromatic compounds and forms a dark coloration or precipitate. This precipitate is not like melanin.

The influence of neutral salts on indicators, L. MICHAELIS and P. RONA (*Biochem. Ztschr., 23 (1910), No. 1-2, pp. 61-67*).—The authors in a previous article have shown that the color shades of some indicators depend not only upon the H ion concentration but also upon the neutral salts contained in the solution. The present work deals with the extent to which this latter factor influences the determination of the H ions in practice.

An evolution method for the determination of sulphur in sulphids and sulphates, F. C. MATHERS (*Proc. Ind. Acad. Sci. 1908, pp. 159, 160*).—This is a method for the determination of sulphur in sulphids and sulphates and in the presence of metals which interfere with the precipitation of barium sulphate. It consists of reducing the salt (potassium sulphate, etc.) with magnesium turnings in a crucible and heating. The rest of the procedure coincides with the ordinary volumetric evolution method for sulphur in iron and steel.

[Shellfish examination], J. JOHNSTONE (*Jour. Hyg. [Cambridge], 9 (1909), No. 4, pp. 412-440, pl. 1*).—A consideration of the routine methods for the bacteriological examination of shellfish. The following factors enter into the examination: Sampling, isolation of intestinal bacteria, precision of the counts, characters of the organisms isolated, cultural reactions of the coli group and the variability of these reactions, standards of permissible impurity, and cleansing of polluted shellfish. Some bacterial data are presented to illustrate some of the above.

Methods for testing shellfish for pollution, S. DEM. GAGE (*Jour. Infect. Diseases, 7 (1910), No. 1, pp. 78-86*).—Experimental methods are described and the interpretation of results discussed.

The detection of paraffin wax in lard, B. H. GERRANS (*Brit. Food Jour., 12 (1910), No. 133, p. 4*).—Place 3 cc. of the melted lard or lard composition in a test tube, add 10 cc. of alcohol-chloroform mixture, heat in a water bath until a homogeneous fluid is obtained, and then cool the mixture by immersing it in cold water. If paraffin is present to the extent of 1 per cent turbidity will set in in 5 minutes' time, and if there are large amounts a crystallization results.

About the examination and judgment of flour, C. ARRAGON (*Chem. Ztg., 34 (1910), Nos. 2, pp. 9, 10; 3, pp. 17, 18; 4, pp. 25, 26*).—This is a description and discussion of methods, with numerous analyses of Swiss and German flours.

The importance is pointed out of dividing flours into 3 general classes, namely, white, half white, and crude. This classifying can be done on the basis of the macroscopic findings with the Pekarisation test. A flour should possess good adhesive properties when pressed between the fingers; it must do this without balling. With white flours the ash content varied between 0.35 and 0.4 per cent, and a greater limit was obtained in some flours which were produced in mills which employ flat stones for the grinding. Half white flours had an ash content of from 0.42 to 0.5 per cent, with an average of 0.46 per cent, while crude flours varied between 0.6 and 0.9 per cent. Those with a

higher ash content than the above should be classed with the animal feeds, but may be employed in certain instances for bread specialties, such as "nutrition breads."

Researches on some rapid tests for the control of flours, S. BAKARDJIEFF (*Recherches sur Quelques Procédés Rapides pour le Contrôle des Farines. Thesis, Univ. Lausanne, 1908; rev. in Centbl. Bakt.* [etc.], *2. Abt., 24 (1909), No. 16–17, p. 475*).—The author prefers the use of the hydrogen peroxid decomposition test to detect flours destroyed by hyphomycetes. The use of the guaiac test alone or in conjunction with oil of turpentine serves to a certain degree for the detection of different varieties of flours. For detecting sawdust paraphenylendiamin is recommended. Talcum is detected by the chloroform test.

Hydrocyanic acid in cassava flour, L. VUAFLART (*Bul. Assoc. Chim. Sucr. et Distill., 27 (1909), No. 3, pp. 225–228; abs. in Jour. Chem. Soc.* [*London*], *96 (1909), No. 565, II, p. 925*).—A sample of cassava flour, which was sold as a feed for animals, was found to contain 0.0041 per cent of hydrocyanic acid.

A reaction for champignons, M. LÖWY (*Chem. Ztg., 33 (1909), No. 143, p. 1251*).—Concentrated sulphuric acid (66 B.) yields with a watery extract of champignons a deep violet coloration. The varieties of mushrooms which are commonly mistaken for these give a yellow coloration.

Suggested modification of the Winton lead number, especially as applied to mixtures of maple and cane sugar sirups, S. H. ROSS (*U. S. Dept. Agr., Bur. Chem. Circ. 53, pp. 9*).—The results obtained with the original Winton method (E. S. R., 18, p. 420) when used with a mixture of cane and maple sugar are not proportional to the actual amount of maple sugar present. The author proposes to modify the method by adding a solution of potassium sulphate to the test solution, in order to overcome the solvent and disturbing action of the sugar.

Concerning coffee, C. HARTWICH (*Ztschr. Untersuch. Nahr. u. Genussmtl., 18 (1909), No. 12, pp. 721–733, figs. 27*).—Histological and other data are reported and discussed with reference to the identification of coffee of different sorts. A section is also devoted to coffee beetles.

The analysis and composition of coffee, chicory, and coffee and chicory essence, R. R. TATLOCK and R. T. THOMSON (*Chem. Trade Jour., 45 (1909), No. 1175, p. 500; abs. in Brit. Food Jour., 11 (1909), No. 132, pp. 225, 226*).—Analytical methods are discussed in this paper, which was presented at a meeting of the Scottish section of the Society of Chemical Industry, November, 1909.

The aphrometer as a means of studying the aging of wine, R. BINAGHI (*Ann. Falsif., 3 (1910), No. 15, pp. 36–38, figs. 2*).—An illustrated description is given of this instrument, which is designed to facilitate the examination of wine.

Spoilage of mustard, A. KOSSOWICZ (*Ztschr. Landw. Versuchsw. Österr., 12 (1909), No. 5, p. 464; abs. in Centbl. Bakt.* [etc.], *2. Abt., 24 (1909), No. 16–17, p. 462*).—An acetifying organism was found to produce a spoilage of a mustard mixture. The organism was later isolated from the vinegar employed in making the mustard, and when inoculated into sterile mustards produced a decomposition of the same kind in a few days.

The use of fluorids for conserving tomatoes, E. CARLINFANTI and R. TUFFI (*Arch. Farmacol. Sper. e Sci. Aff., 8 (1909), pp. 377–384; abs. in Chem. Zentbl., 1909, II, No. 20, pp. 1765, 1766*).—The authors describe the manufacture of the various tomato sauces and the analyses of the salt and sodium fluorid which are used in preserving them. A method for detecting the fluorid is given, which consists of converting the sodium fluorid into calcium fluorid, decomposing this in the dry state with sulphuric acid, and allowing the resulting vapors to act

on glass. The method is sensitive to 0.05 per cent sodium fluorid. The Amberg and Loevenhart biochemical method did not yield good results.

Is formic acid a constituent of raspberries? A. RÖHRIG (*Ztschr. Untersuch. Nahr. u. Genussmtl., 19 (1910), No. 1, pp. 1–8, fig. 1*).—The occurrence of formic acid in raspberries was demonstrated, but the amount was so extremely low that according to the author it could not be confused with added formic acid in fruit juices, marmalades, and other such goods.

The determination of casein in milk by Matthaiopoulos method, A. BURR and F. M. BERBERICH (*Molk. Ztg.* [*Hildesheim*], *23 (1909), No. 52, pp. 1453, 1454*).—Comparative tests between the Natthaipoulos and Schlossmann methods showed in 15 cases variations between 0.1 and 0.67 per cent. The authors state that in certain colostrum milks the titration method is inapplicable. Attention is drawn to the fact that marked variations may result if too much acid is employed in precipitating the casein.

[The Matthaiopoulos method for casein], W. C. DE GRAAFF (*Pharm. Weekbl., 47 (1910), No. 2, pp. 34, 35*).—The test yields reliable results and is not so cumbersome as the classical Hoppe-Seyler method.

The detection of heated milk, W. C. DE GRAAFF (*Pharm. Weekbl., 47 (1910), No. 2, pp. 35, 36*).—The author employs a 20 per cent solution of pyrocatechin in alcohol. This reagent is very stable and gives more constant results than Storch's reagent.

Apparatus for catalase determination, T. HENKEL (*Molk. Ztg. Berlin, 20 (1910), Nos. 2, pp. 13, 14; 3, pp. 25–27, figs. 4*).—Owing to the fact that Koestler's apparatus for catalase determination is somewhat complicated, and for this reason can not be employed by the average dairyman, the author constructed an apparatus which consists essentially of two test tubes, one of which is graduated at its lower end (eudiometer tube) into cubic centimeters, and the other which serves as the evolution bottle, the two being connected by means of a sigmoid-shaped glass tube. The evolved oxygen passes from one tube to the other, where it is measured. The gas is collected over water.

On the influence of feeding coconut cake on the composition of milk fat, C. SCHOENEMANN (*Ber. Physiol. Lab. u. Vers. Anst. Landw. Inst. Halle, 1909, No. 19, pp. 1–42, charts 4*).—When coconut cake in amounts varying from 2.5 to 4.5 kg. daily per 1,000 lbs. live weight was added to the rations of 2 milch cows, an analysis of the butter showed that the Polenske number varied proportionally with the amount of cake fed. From this the author concludes that the Polenske number is not an absolutely accurate method of detecting butter that has been adulterated with coconut oil. A rise in the Polenske number may occur either by feeding the cake to the cows or by adding oil to the butter, thus making it impossible to say whether the coconut fat has been added to the butter itself or whether it had been fed to the animal as coconut cake.

A new method of oil analysis by noting the miscibility curve, E. LOUISE (*Ann. Falsif., 3 (1910), No. 15, pp. 8–13, figs. 3*).—Directions are given for operating the method and the apparatus therefor, previously noted (E. S. R., 19, p. 705), and the application of this constant for detecting adulterations, etc., in oils used as foods is explained.

Some ready mixed paints, E. F. LADD and G. A. ABBOTT (*North Dakota Sta. Bul. 86, pp. 80–124*).—This is a report of analyses of various paints and white leads. There are listed 29 paints which contained more than 15 per cent of inert material, i. e., other constituents than white lead, lead sulphate, zinc oxid, color, undetermined matter, or an excess of benzin and water. Of the paints examined, 16 contained over 5 per cent of water in the vehicle.

Successful jam making and fruit bottling, LUCY H. YATES (*London, 1909, pp. XIV+122, pl. 1, figs. 5*).—Detailed directions are given for making jams

and preserves of various sorts, the apparatus used is described, and many recipes are included. Chapters are devoted to storing and packing and to the marketing of stock. The volume as a whole is prepared from the standpoint of fruit preserving as a home industry.

Wine from the vine to consumption, F. GOLDSCHMIDT (*Der Wein von der Rebe bis zum Konsum. Mayence, 1909, 5. ed., rev. and enl., pp. XII+737, pls. 7, figs. 497*).—A practical book on the art of wine making. It also includes chapters on the diseases of wine, chemical examination of wine, and a description of the wines of various countries.

Vinification, M. BLUNNO (*Dept. Agr. N. S. Wales, Farmers' Bul. 19, pp. 21, figs. 7*).—A descriptive circular on the practical preparation of wine, particularly in hot countries.

METEOROLOGY—WATER.

General weather review, 1907–8, W. M. ESTEN (*Connecticut Storrs Sta. Rpt. 1908–9, pp. 454–477, charts 4*).—A record is given of observations on temperature and precipitation during each month of 1907 and 1908 at Storrs, the rainfall during the 6 months ended October 31, 1907, and for the same period in 1908, at 16 places in Connecticut, a summary of rainfall for this period for 20 places in Connecticut during the 19 years, 1889 to 1907, and the monthly mean temperature, monthly precipitation, and dates of the last and first killing frost for the 20 years, 1888 to 1907, at Storrs. The mean temperature at Storrs during the 20 years has been 46.4° F., the highest 96°, and the lowest −13.3°. The mean annual rainfall has been 46 in., the longest growing season 173 days, and the shortest 114, the average date of the last killing frost in the spring, May 7, and of the first killing frost in the autumn October 2.

Meteorological record, C. WILLIS (*South Dakota Sta. Rpt. 1909, pp. 22–33*).—Tabular records of daily observations at Brookings on temperature, precipitation, prevailing wind and cloudiness, are given for each month of the year ended June 30, 1909.

Swedish meteorological observations, 1908, H. E. HAMBERG (*Met. Iakttag. Sverige [Observ. Mét. Suéd.], K. Svenska Vetensk. Akad., 50 (1908), pp. X+157; Bihang 1, pp. 39, pls 15*).—These are the usual meteorological summaries of observations made under the direction of the Central Meteorological Institute of Sweden.

Drainage, J. W. LEATHER and H. E. ANNETT (*Rpt. Agr. Research Inst. and Col. Pusa [India], 1907–1909, pp. 40, 41*).—Data obtained with drain gages at the Agricultural Research Institute and College at Pusa are briefly reviewed. These show that with a rainfall of 40.3 in. during the year ended September 30, 1907, there was an evaporation of 28.8 in., as compared with an average evaporation of 17 in. per year at the Cawnpore Experimental Farm. The drainage water removed 20 lbs. per acre of nitrate from bare fallow soil and only 0.04 lb. from soil covered with grass.

The circulation of water in alluvial soils and the methods of studying it, F. DIENERT (*Tech. Sanit., 4 (1909), pp. 9–20; abs. in Wasser u. Abwasser, 2 (1909), No. 2, pp. 87–91, figs. 2*).—The various conditions of occurrence of ground water in alluvial soils are stated, and methods of collecting samples and studying the chemical and bacteriological conditions and the movement of the water are discussed. The application of the Slichter method (E. S. R., 14, p. 640) in studying the flow of the water is described.

Fertilizing fish ponds (*Mark Lane Express, 103 (1910), No. 4090, p. 171*).—The practice followed to a considerable extent in Germany of applying fertilizers to fish ponds in order to increase the growth of the natural food of the fish

is briefly described, and experiments are reported which indicate "that it is better to supply nourishment for the crop of fish indirectly by increasing the vegetation in the ponds by means of fertilizers than to supply food direct by grains and other substances."

A new suggestion for the preparation of potable water, A. H. HAYES (*Jour. Roy. Army Med. Corps, 14 (1910), No. 1, pp. 75–77, figs. 2*).—A simple portable apparatus for the clarification of muddy water by means of a gelatinous precipitate of aluminum hydroxid is described, and tests of its efficiency are reported.

Water and sewage, E. HASELHOFF (*Wasser und Abwässer. Leipsic, 1909, pp. 140; rev. in Wasser u. Abwässer, 2 (1910), No. 7, p. 299*).—This is a concise treatise, suited especially for nontechnical readers, on the source, composition, selection, and examination of water for household and industrial purposes, and on the source, composition, harmfulness, and disposal of sewage and waste waters. Methods of examination are briefly explained and a short bibliography is given.

The purification of waste water of dairies, A. CHASSEVANT (*Indus. Lait. [Paris], 35 (1910), No. 6, pp. 81–93*).—This is a paper read before the fourth National Congress of the Dairy Industry at Paris in February, 1910, and deals with chemical and biological processes and irrigation as means of disposing of the waste waters of dairies. Attention is called to the great importance of purifying such wastes before they are discharged into streams or allowed to percolate into the subsoil, and reference is made to the French laws and regulations requiring such purification. The author is of the opinion that broad irrigation is the best, least expensive, and most profitable method of purification, although under certain special conditions the use of a combined chemical and biological process may be preferable.

Sewage into sugar, J. ASHTON (*Surveyor, 37 (1910), No. 943, pp. 211, 212; abs. in Engin. News, 63 (1910), No. 10, pp. 297, 298*).—A system of sewage irrigation adapted to the production of sugar beets is described.

SOILS—FERTILIZERS.

Clay, P. ROHLAND (*Die Tone. Vienna and Leipsic, 1909, pp. 127*).—This book is based upon investigations begun by the author in 1902 to determine the cause of plasticity in clay.

These investigations have shown that in clay treated with water colloid substances are formed which give the clay its plastic properties. This discovery explains many phenomena associated with the semipermeability and absorptive power of clay which are of great importance from the standpoint of agricultural chemistry and plant physiology, as well as in connection with the purification of water and the manufacture of clay wares.

The matter collected in this book has already been published to a large extent in periodical literature. The four chapters into which the book is divided deal with kaolinization, the physical-chemical properties of clay, the newly discovered properties of clay, and their applications to processes in cultivated soil.

Commercial peat: Its uses and possibilities, F. T. GISSING (*London and Philadelphia, 1910, pp. X+191, pls. 16, figs. 43*).—This book discusses various industrial uses of peat, including among other things the manufacture of alcohol, ammonia, and nitrates, and the utilization of peat for sewage purposes, the reclamation of peat lands, machinery used in handling and preparing peat for various purposes, and peat deposits in different countries.

A bibliography of the subject is also given.

Investigations on weathering in the Tropics, E. C. J. MOHR (*Bul. Dépt. Agr. Indes Néerland., 1909, No. 32, pp. 26, figs. 2*).—Investigations on the effect of rain water on freshly ground tertiary basalt under moist warm climatic conditions are reported.

The rock was used in 3 sizes, $\frac{1}{3}$ to $\frac{1}{2}$, 1 to $1\frac{1}{2}$, and 3 to 4 mm. particles. It was subjected to the action of rain water from July, 1906 to December, 1908, in an apparatus so arranged that in one series the level of the water was above that of the rock particles, and in the other the particles were kept moist by rise of water from below. The principal fact noted in the first series was that the silicic acid corresponding to the decomposed augit and lime feldspar was washed out with the soluble bases while the silicic acid corresponding to the alkali feldspar remained behind as kaolin. In the second series, only the silicic acid corresponding to decomposed augit was removed and the silicic acid corresponding to lime feldspar remained behind.

Experiments on the plant food requirements of forest soils and tests of samples of porphyrite soils, H. VATER (*Tharand. Forstl. Jahrb., 59 (1909), No. 2, pp. 177–212*).—The methods used in studying the composition and fertilizer requirements of the soils are described. The general result obtained in the fertilizer experiments was that on the porphyritic soils poor in silica the turning under of a dead cover 5 cm. (1.97 in.) deep gave only 7 per cent of the increased growth of trees obtained with complete manuring. Phosphoric acid was apparently the fertilizing constituent most needed in the soils experimented with.

Mechanical and chemical analyses of soils, C. A. WEBER (*Arb. Deut. Landw. Gesell., 1909, No. 165, pp. 137–142*).—Analyses of a number of marsh soils are reported.

Chemical composition and fertilizing of the soils of the Taurida Government, N. DUBROVSKII (*Zap. Simfer. Otd. Imp. Ross. Obshch. Sadov., 1908, July; abs. in Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 10 (1909), No. 4, pp. 566–568*).—These soils are poor in phosphoric acid but sufficiently provided with nitrogen and potash. They are therefore greatly benefited by phosphatic fertilizers, which cause a considerable increase of the yields of wheat and rye.

Analytical study of some soils of southern Italian Somaliland, G. MANGANO (*Agr. Colon. [Italy], 3 (1909), No. 6, pp. 398–413, fig. 1*).—Physical and chemical analyses of 40 samples of soils are given, together with detailed observations on the vegetation and physical characteristics of the locality from which each sample was taken. There is also a table showing the status (deficiency, sufficiency, or abundance) of each sample of soil in regard to nitrogen, phosphoric acid, potash, and lime.

The general conclusion is that most of the soils show a good degree of fertility and that when a sufficient system of irrigation is installed it will be possible to cultivate many of the important economic plants of the tropics.

Nature of the soil and subsoil and the underground waters of the Nile Valley, C. BEAUGÉ (*Jour. Agr. Prat., n. ser., 19 (1910), No. 3, pp. 89–91; Rev. Gén. Agron., n. ser., 5 (1910), No. 1, pp. 4–7*).—It is shown that while the soils of the Nile Valley are variable in character, the predominating type in the cultivated area is a silt clay.

The average of a large number of analyses of samples of this soil shows a composition of silica 45 per cent, clay 53 per cent, magnesia 0.2 to 1.6 per cent, lime 1.3 to 4.9 per cent, nitrogen 0.03 to 0.1 per cent, and phosphoric acid 0.03 to 0.3 per cent. There are certain heavy soils which contain as high as 84 per cent of clay and some very light soils containing as high as 68 per cent of sand. The percentage of chlorin notably increases as the Mediterranean Sea is ap-

proached, there being as much as 4 per cent of this constituent in the soil of the lower parts of the Delta.

In general it may be said that the soils of Egypt contain much silica, alumina, and oxid of iron, less lime, small quantities of phosphoric acid, and a small content of organic matter, never exceeding 4 to 9 per cent.

Studies of the subterranean waters of the Nile Valley show that these are controlled to a large extent by the flood stage of the Nile and to a less extent by the number and location of the irrigation canals. The underground waters vary widely in chemical composition, and observations of experimental wells show that the water infiltrating into the subsoil is much richer in soluble constituents than the Nile water, there being considerable increases, particularly in carbonates, calcium and magnesium sulphates, and sodium chlorid.

The specific heat of certain soils, principally Russian, A. N. SABANIN (*Pochvovyedyenie* [*Pédologie*], *10* (*1908*), *No. 4, pp. 287–291*).—From examinations of 21 soils representing a variety of types the following conclusions were drawn: There were very sharp fluctuations in the thermic capacity of the different soils and the calculated and observed capacities did not coincide in a majority of cases. This thermic capacity was determined chiefly by the relative proportions of sand, clay, and humus in soils dried at 105° C., and also by the proportion of water in air dried soils. The thermic capacity diminished from the surface layer downward.

Factors which determine fertility in soils, E. J. RUSSELL (*Sci. Prog. Twentieth Cent., 4* (*1910*), *No. 15, pp. 353–365, pl. 1, figs. 3*).—This article is based upon the author's studies of the chemical and biological changes which take place in the organic matter of soils under varying conditions (E. S. R., 22, p. 121). In these investigations a change was induced in the micro-organic flora of the soil, usually by partial sterilization with toluene or by heat, and the alteration in the flora and the change in the course of the soil decomposition were observed and as far as possible correlated.

A short bibliography of the subject is given.

Do soils wear out? (*Amer. Agr., 85* (*1910*), *No. 9, pp. 296–298, 306, 307, figs. 2*).—This is a collection of short articles on What the Past Teaches, by M. Whitney; Soils are Sick, by H. Hayward; Humus and Lime will Help, by T. L. Lyon; Soils May Be Improved, by M. F. Miller; Soils Improve or Go Back, by T. F. Hunt; Soils Respond to Good Treatment, by B. W. Kilgore; and Farming Methods at Fault, by A. M. Soule.

In a general way these articles answer the question of the title in the negative. They show, however, how soils decline in productiveness under bad treatment, and as a rule improve under good treatment. A realization of this in the United States is leading to the replacement of the old exhaustive methods of culture by better systems of cropping, manuring, and tillage, resulting in increasing yields.

Soil improvement experiments on light moor and sandy soils, SCHULZE-DIEKHOFF (*Deut. Landw. Presse, 37* (*1910*), *No. 8, pp. 84, 85, figs. 2*).—The marked improvement of such soils by the use of Thomas slag and kainit is reported.

Potash and the mobilization of organic nitrogen in humus soils, P. RENAULT (*Engrais, 25* (*1910*), *No. 5, pp. 132–135*).—This article states that acidity is not always the cause of the low nitrifying power of peat soils. Experiments by Dumont are referred to as showing that slow nitrification is frequently due not to lack of lime but to the form of the organic matter, and that slow ammonification and subsequent nitrification is always accompanied by a low percentage of potash. Dumont's experiments showed that carbonate of potash directly favors nitrification and that the application of sulphate and

chlorid of potash indirectly favors it, these salts being ultimately transformed into carbonate in the soil.

Nitrification in soils, K. F. KELLERMAN, E. R. ALLEN, and I. G. MCBETH (*Abs. in Science, n. ser., 31 (1910), No. 790, p. 280*).—A brief abstract is given of a paper read before the Chemical Society of Washington, in which is set forth the modern view of the soil as a live matrix supporting various definite groups of micro-organisms and suggesting the possibility that bacteriological diagnoses may determine the crop-producing power of different soils and the causes thereof. It is pointed out that the action of nitrifying bacteria in soil samples correlates fairly well with the productiveness of the soil under field conditions.

Tests of commercial cultures for soil inoculation, J. G. LIPMAN (*New Jersey Stas. Bul. 227, pp. 3–23, pls. 2, figs. 3*).—The results of the tests reported in this bulletin are summarized as follows:

"The pot experiments with Farmogerm and Nitragin demonstrated that these cultures contain large numbers of vigorous bacteria.

"Alfalfa soil and Farmogerm cultures for alfalfa were not capable of serving any useful purpose on land deficient in lime.

"On properly limed soils cultures of Farmogerm for alfalfa, cowpeas, and red clover gave satisfactory returns.

"A culture of Farmogerm for soy beans failed to cause inoculation.

"A comparative test of Farmogerm and Nitragin cultures for Lima beans and cowpeas showed the superiority of the former for cowpeas and the superiority of the latter for Lima beans.

"No cross inoculation occurred between Canada field peas and cowpeas, and between lupines and soy beans.

"Cooperative tests of Nitragin cultures for cowpeas on different soils and in different parts of the State gave positive results in three out of four cases.

"The experiments recorded here show that on soils properly drained and properly supplied with moisture, lime, phosphates, and potash, the commercial cultures, Farmogerm and Nitragin, are capable of increasing the yields of such leguminous crops as had not been previously grown on the land."

Nitrogen, the plant, and the farmer, J. M. HECTOR (*Scot. Farmer, 18 (1910), Nos. 891, p. 86; 892, pp. 105, 106; 893, p. 129; 894, p. 150*).—This is a review of investigations on the fixation of free nitrogen by plants.

Bacterial activity as a corrosive influence in the soil, R. H. GAINES (*Abs. in Science, n. ser., 31 (1910), No. 790, p. 269*).—This is an abstract of a paper read at the Boston meeting of the American Chemical Society, in which the corrosion of iron and steel structures embedded in the soil is ascribed to acid constituents of the soil resulting from bacterial activity. The remedies proposed are free drainage or the use of slaked lime to neutralize the acids.

The rôle of fertilizers, L. CHAPTAL (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 31 (1910), No. 8, pp. 232–236*).—This is a brief discussion of the theories of soil fertility and the functions of fertilizers advanced by the Bureau of Soils of this Department.

Fertilizers and fertility, J. F. COWELL (*Proc. Soc. Amer. Florists, 24 (1908), pp. 51–57*).—The recent advances in scientific knowledge on this subject are briefly reviewed with especial reference to their bearing upon horticultural production.

Formulæ for preparing fertilizers, F. B. GUTHRIE (*Dept. Agr. N. S. Wales, Farmers' Bul. 17, pp. 29, fig. 1*).—The fertilizer mixtures given in this bulletin are suggested as fulfilling the requirements of different crops on average soil under conditions in New South Wales.

Fertilizer and acid plants, F. E. MacKnight (*New York, 1909, pp. 95, figs. 20*).—This book deals primarily with the insurance of fertilizer and acid plants, but incidentally discusses the development of the fertilizer industry and the character of the principal sources of fertilizing materials.

The action and value of stable manure, B. Schulze (*Jahrb. Deut. Landw. Gesell., 24 (1909), No. 1, pp. 162–172; abs. in Zentbl. Agr. Chem., 38 (1909), No. 11, pp. 745–749; Centbl. Bakt.* [*etc.*], *2. Abt., 26 (1910), No. 8–9, pp. 274, 275*).—This article briefly summarizes the results of 4 years field experiments at the Breslau Experiment Station, in which stable manure was ussed alone and in combination with various fertilizing materials supplying potash, phosphoric acid, and nitrogen.

The experiments were planned on the assumption that stable manure has the greatest effect during the first year and thereafter decreases more or less in efficiency, and that the action of commercial fertilizers in connection with the manure will be less marked during the first year and will steadily increase thereafter. The soils used in the experiments were very variable in character ranging from cold heavy clay to warm light sandy soils. The crop rotation used included potatoes, sugar beets, and cereals (oats, rye, barley, and wheat).

The smallest benefit from the manuring was obtained on heavy cold clay soil, the highest on humus sandy soil. The most profitable return was obtained with stable manure without mineral fertilizers, the least profit with the addition of complete mineral fertilizer. The potash of the stable manure appeared to be the constituent most readily utilized by plants. Apparently about 24.3 per cent of the nitrogen of the manure was utilized, but the utilization coefficient varied widely, from 17.8 to 40.6 per cent. The smallest utilization was observed in the case of cold heavy loam soils, the highest in humus sandy soils. During the first 3 years 30.2 per cent of the phosphoric acid of the stable manure was utilized, the percentage utilized being especially high in the case of the very light soils. The average utilization of potash was 39.6 per cent. In case of the heavier soils the action of the manure was modified to some extent by liming, the utilization of the fertilizing constituents of the manure being in all cases increased.

Experiments on the action of stable manure on upland moors, W. Bersch (*Ztschr. Moorkultur u. Torfverwert., 7 (1909), No. 6, pp. 255–280*).—As a result of experiments during 1908 and 1909 on slightly decomposed upland moors in the raw, rainy climate of the Alps, the author concludes that commercial fertilizers are preferable to stable manure for improving such soils. The manure proved beneficial to potatoes the first year only when used in large amounts, at least 13.36 tons per acre. The after effect was small. Commercial fertilizers gave the best direct and after effect.

The fertilizer recommended for application on potatoes the first year is at least 178.5 lbs. of phosphoric acid in the form of Thomas slag, 178.5 lbs. of potash as 40 per cent potash salt, and 66.9 lbs. of nitrogen in the form of nitrate of soda. If stable manure is used it is recommended that it be used at the rate of about 8.9 tons per acre and supplemented with commercial fertilizers.

In regions of abundant rainfall the best results will as a rule be obtained by applying easily soluble fertilizing materials in the spring. Thomas slag may also be applied at this time with good results. Moderate applications of lime produced beneficial effects by favoring the decomposition of the raw moor soils and also apparently promoted the decomposition of stable manure.

Sulphate of iron as a preservative for liquid manure, A. Hasler (*Deut. Landw. Presse, 37 (1910), No. 6, p. 62*).—The use of about 1 lb. of sulphate of iron to 264 gal. of liquid manure was found to be an effective means of preservation.

Artificial nitrates (*Chem. Trade Jour., 46 (1910), No. 1188, pp. 219, 220*).—Factories installed and processes used in France and Germany in the manufacture of nitrates and nitric acid by the fixation of atmospheric nitrogen are briefly described.

The Woltereck ammonia process against the Frank-Caro gas process, O. K. Zwingenberger (*Jour. Amer. Peat Soc., 2 (1910), No. 4, pp. 141-144*).—The Woltereck and the Frank and Caro processes for the manufacture of ammonia and gas from peat by wet combustion are compared.

The reduction of atmospheric nitrogen (*Sci. Amer. Sup., 69 (1910), No. 1784, p. 162, fig. 1*).—The Schönherr process is described.

The occurrence of ammonia in deep waters containing iron and manganese, H. Noll (*Ztschr. Angew. Chem., 23 (1910), No. 3, pp. 107, 108*).—The author reports experiments which do not confirm Klut's conclusion that the chemical-physical processes by which ammonia is formed in the lower strata of the earth can be reproduced in the laboratory under ordinary pressure conditions.

Tests with four nitrogenous manures (*Dept. Agr. and Tech. Instr. Ireland Jour., 10 (1910), No. 2, pp. 352-354; Mark Lane Express, 103 (1910), No. 4091, pp. 201, 203*).—Results of comparative tests of nitrate of soda, sulphate of ammonia, calcium cyanamid, and calcium nitrate on oats, potatoes, turnips, and mangolds are reported. The results indicate "that the two new nitrogenous manures are not inferior to the two manures which are already in general use. On the whole, there is not a great difference in yield with any of the crops. Calcium cyanamid gave the most satisfactory return with oats and potatoes, and nitrate of lime with oats and mangolds."

The action of lime nitrogen, nitrate of soda, and sulphate of ammonia, J. J. Vañha et al. (*Ztschr. Landw. Versuchsw. Österr., 12 (1909), No. 12, pp. 785-838*).—The manufacture and properties of calcium cyanamid as well as the changes which it undergoes in storage and in soil are briefly described, and field and pot experiments with sugar beets and pot experiments with wheat and barley, comparing the fertilizing effect of the cyanamid with that of nitrate of soda and sulphate of ammonia are reported. Particular attention was given in these experiments to the influence of varying mechanical composition of the soils on the action of the cyanamid.

In field experiments with beets on clay soil the cyanamid showed 58 per cent of the efficiency of nitrate of soda, while the relative efficiency of sulphate of ammonia was 66 per cent. In general it was found that while cyanamid was an efficient fertilizer on all kinds of soils requiring nitrogenous fertilizers, it gave the best results on poor sandy soils and the poorest results on the better quality of very heavy clay soils.

Calcium nitrate or sodium nitrate, P. Wagner (*Mitt. Deut. Landw. Gesell., 25 (1910), No. 8, pp. 107-109*).—Comparative tests of calcium nitrate and sodium nitrate on beets, potatoes, rye, oats, and barley are reported. The results showed as a rule that equal amounts of nitrogen in the form of sodium nitrate or calcium nitrate either gave equally good results, or, when there was a difference, that the sodium nitrate was somewhat more effective than the calcium nitrate on ordinary soils.

Calcium nitrate, calcium cyanamid, nitrate of soda, and kainit, E. Saillard (*Sucr. Indig. et Colon., 75 (1910), No. 6, pp. 126-129*).—Comparative tests of these fertilizing materials on sugar beets in different parts of France are reported.

The results show that nitrate of soda and calcium cyanamid employed at rates furnishing about 26.78 lbs. of nitrogen per acre gave about the same results, and that calcium nitrate applied at the same rate was slightly superior.

Potash salts gave improved yields in the greater number of the experiments. When kainit and potassium chlorid were applied at rates furnishing the same amount of potash the former gave slightly the better results.

Manuring the potato crop (*Mark Lane Express, 103 (1910), No. 4089, p. 137*).—The recommendations of various authorities on this subject are summarized, including those based upon recent experiments in Scotland with lime nitrogen.

The action of phonolite as a potash fertilizer, B. TACKE (*Illus. Landw. Ztg., 30 (1910), No. 3, pp. 13, 14*).—Experiments on moor soils with potatoes, oats, and rye are reported, the results indicating that there is no advantage under such conditions in substituting phonolite for the ordinary potash salts.

The value of the new silicate of potash fertilizer, T. REMY (*Illus. Landw. Ztg., 30 (1910), Nos. 6, pp. 39–42; 7, pp. 48–50*).—The results of experiments with various crops on different kinds of soil indicate that while the phonolite meal has a certain fertilizing value it is very difficultly available and is slowly utilized by plants.

On the occurrence of potash salts in foreign countries, H. ERDMANN (*Kuxen Ztg., 14 (1910), No. 19, pp. 1–3*).—Reference is made in this article to the occurrence of potash in the nitrate deposits of India and Chile, in the by-products of salt manufacture in France and Russia, in the salt deposits of Galicia, and in the alkali salts of Tibet, Mongolia, and southern California.

New potash discoveries, T. J. ALBERT (*Daily Cons. and Trade Rpts. [U. S.], 1910, No. 3717, p. 5*).—Attention is called to an announcement of the discovery of deposits of potash salts in China.

On what kinds of soil can Thomas slag be replaced by other phosphates? B. TACKE (*Hannover. Land u. Forstw. Ztg., 62 (1909), p. 414; abs. in Zentbl. Agr. Chem., 39 (1910), No. 1, pp. 9–11*).—Comparative tests of Thomas slag and Algerian and Lahn phosphates on different kinds of soils are reported, the general conclusion being that on acid humus soils containing from 0.05 to 0.1 per cent of free acid Thomas slag may be profitably replaced by the insoluble phosphates, the applications of the latter being increased about one-fifth over that of Thomas slag.

The possibility of finding phosphate deposits in Australia, H. I. JENSEN (*Agr. Gaz. [Tasmania], 17 (1909), No. 12, pp. 279, 280; Amer. Fert., 32 (1910), No. 5, pp. 7–10*).—To aid prospectors and encourage the search for phosphate deposits, the sources and types of phosphates and the geological conditions under which deposits are likely to occur are briefly described with special reference to the possible occurrence of apatite, phosphorite bone beds, and guano in Australia.

A reconnaissance of the gypsum deposits of California, F. L. HESS (*U. S. Geol. Survey Bul. 413, pp. 37, pls. 4, figs. 2*).—This bulletin deals briefly with the distribution, classification, and description of the deposits. It also contains a note by G. Steiger on errors in the chemical analysis of gypsum due to dehydration in the process of grinding.

The use of manganese and uranium as fertilizers, J. RAY and G. PRADIER (*Jour. Agr. Prat., n. ser., 18 (1909), No. 35, pp. 311, 312; abs. in Rev. Gén. Chim., 13 (1910), No. 1, Repert., p. 32*).—It is reported that the use of manganese sulphate on apricots produced a more luxuriant vegetation and increased the size of the fruits. The use of a very dilute solution of uranium nitrate stimulated the growth of young cherry and pear trees, but was without result on trees 5 to 6 years old.

Commercial value of some waste products, F. B. GUTHRIE (*Agr. Gaz. N. S. Wales, 20 (1909), No. 11, pp. 966–968*).—This article gives analyses and dis-

cusses the fertilizing value of tobacco stalks and ash, tanyard refuse, and burnt sheep manure.

The more important fertilizing constituents in the tobacco ash were potash 24.08 per cent, phosphoric acid 5.33 per cent, lime 22.44 per cent, and magnesia 11.16 per cent; in the unburnt tobacco stalks nitrogen 2.5 per cent, phosphoric acid 1.13 per cent, potash 5.1 per cent, and lime 4.75 per cent. The ashes of sheep manure contained phosphoric acid 0.83 per cent, potash 7.94 per cent, and lime 6.4 per cent. The original manure from which the ashes were obtained contained nitrogen 0.7 per cent, potash 1 per cent, and phosphoric acid 0.5 per cent.

Tobacco stalks and ash, F. B. Guthrie (*Amer. Fert., 32 (1910), No. 4, p. 29*).—See the article noted above.

Hummock soil as fertilizer, A. Mayer (*Deut. Landw. Presse, 37 (1910), No. 5, pp. 49, 50*).—The fertilizing value of the soil of mounds in certain parts of Holland, which were formerly occupied by dwellings, or by cattle during floods, is discussed.

The question of household garbage, E. Burelle (*Ann. Soc. Agr. Sci. et Indus. Lyon, 1908, pp. 119–139, figs. 4*).—Methods of collection, transportation, and utilization (including use as fertilizer) or destruction of garbage in various European cities are discussed and a short bibliography of the subject is given.

The whale factory, F. J. Koch (*Amer. Fert., 32 (1910), No. 4, pp. 10, 11, figs. 6*).—The process of converting whale meat into fertilizer at a factory in Labrador is briefly described.

Peat fertilizer filler (*Jour. Amer. Peat Soc., 2 (1910), No. 4, pp. 150–152*).—It is stated in this article that "the largest industry based on peat in the United States is the manufacure of filler for artificial fertilizers." The methods employed in this industry are briefly described.

The loss of potash in the burning of molasses, H. Pellet (*Bul. Assoc. Chim. Sucr. et Distill., 27 (1909), No. 3, pp. 215–217; abs. in Rev. Gén. Chim., 13 (1910), No. 1, Repert., p. 32*).—The author concludes from analyses of deposits in furnaces used for the burning of molasses that the loss of potash in the process is due not only to volatilization of potassium sulphid, as suggested by Bauer, but also to the volatilization of other potash salts.

Analyses of fertilizers, B. E. Curry (*New Hampshire Sta. Bul. 146, pp. 157–164*).—The results of inspection of 138 samples of fertilizers sold in the State during 1909 are reported, with brief notes on valuation and on the quality of the fertilizers. A large percentage of the samples did not come up to guaranty with respect to available phosphoric acid, but on the whole there was no great deviation from guaranty.

[The fertilizer market] (*Oil, Paint, and Drug Reporter, 77 (1910), No. 8, pt. 2, pp. 60–62*).—Reviews are given of the fertilizer market in New York, Chicago, Baltimore, Charleston, and Philadelphia.

It is shown that the demand for fertilizers in the South was greater in 1909 than ever before. The price of nitrate declined as a result of the failure of the nitrate combination and of sulphate of ammonia as a result of the removal of the tariff. The price of potash remained practically unchanged. As a result of a large catch of fish the price of fish scrap was lower. The price of phosphoric acid declined during the year while that of blood and tankage was well maintained. The price of sheep manure in the Chicago market rose rapidly to $9 per ton toward the end of the year. The prices in the markets in other cities were to a large extent controlled by those of New York and Chicago.

AGRICULTURAL BOTANY.

Vegetation and frost, F. F. BLACKMAN (*New Phytol.*, *8* (*1909*), *No. 9–10*, *pp. 354–363*).—The author gives a summary of the present state of our knowledge regarding the action of frost on vegetation. The old idea of Sachs that the injury was due to the subsequent rapid thawing has been shown to be erroneous by Molisch. Mez holds that the protoplasm of the plant is directly susceptible to cold and that each cell has a fatal minimum temperature. Gorke showed that freezing causes a precipitation or "salting out" of some of the soluble proteids and that the temperature required for this purpose varies widely with different species of plants, begonias that are injured by a temperature of —5° C. having part of their protein precipitated at —3°. Winter rye showed the effect of cold at —15° and pine needles at —40°.

Lidforss has recently found an agency in plants that protects them against cold. He finds that all winter-green leaves are quite free from starch but contain sugar and oil in the mesophyll. In the summer these same leaves contain abundant starch. This they regenerate in the spring, or if the plants are brought from the open into a warm room starch is also abundantly formed from sugar. The only exception found by him was in submerged plants, which show starch throughout the winter. By means of experiments he has shown that the sugar in the cells not only aids in keeping down transpiration but also enables the plants to withstand lowered temperatures.

Another phenomenon which seems to be explained by Lidforss's work is the frequent killing of trees early in the spring after they have endured the prolonged cold of winter. This is held to be due to the fact that a succession of warm days causes the regeneration of starch, making the plants more susceptible to sudden cold. This fact was also borne out by observations that it is the south side of trees and shrubs that suffer most from winter injury. The theory of Lidforss is that sugar has a protective action in that it retards the salting out effect reported by Gorke.

The occurrence of sugar and oil in winter in the periderm of tree trunks has also been reported.

Chemical investigations on germination, N. T. DELEANO (*Arch. Sci. Biol.* [*St. Petersb.*], *15* (*1910*), *No. 1*, *pp. 1–24*; *Centbl. Bakt.* [*etc.*], *2. Abt.*, *24* (*1909*), *No. 5–7*, *pp. 130–146*).—A study has been made of some of the more important chemical changes taking place in the germination of oil-bearing seeds.

After a résumé of previous publications on the subject, the author describes his experiments with castor bean seeds. He found that the phenomena connected with the disappearance of fat are not confined to the outside of the cells. The fat content of seeds was fairly well maintained for the first 8 days of the experiments, after which saponification proceeded with great rapidity. He concludes that practically all the fat in oil-bearing seeds is saponified outside of the cells in which it is held as reserve.

In relation to the acidity observed during germination, the author was able to recognize acetic and lactic acids only. The lactic acid was formed during the transformation of the oil, and it is thought to be very probably a secondary product of the fat oxidation. The amount of lactic acid seemed always to be fairly constant, and it is believed that the surplus disappeared by the formation of new combinations.

Studies were also made of the catalase, peroxidase, and other enzyms and their rôle in the germination of the seed.

Light germination, W. KINZEL (*Ber. Deut. Bot. Gesell.*, *27* (*1909*), *No. 9*, *pp. 536–545*, *pl. 1*).—The author records a large number of germination tests

of seeds of various ages under differently colored lights, accompanied by a table showing the relative influence of the various colors on germination.

The effect of certain chemical agents upon the transpiration and growth of wheat seedlings, H. S. REED (*Bot. Gaz., 49 (1910), No. 2, pp. 81–109, figs. 9*).—The present paper is intended to set forth some data upon the effect of chemical compounds, mostly salts, upon the transpiration of wheat plants in relation to the effect of these compounds on the growth of the plants. The data presented were drawn from about 6,000 tests employing soils, soil extracts, and salt solutions. Many of the experiments were carried out in water cultures, while others were made with soils in paraffin baskets. In most of the soil experiments sodium nitrate, potassium sulphate, monocalcium phosphate, and calcium carbonate were used. The experiments are described in detail.

The author concludes that the small amounts of the chemical agents used had a definite influence upon the correlative transpiration. In the case of lime and sodium phosphate the transpiration was increased, while potassium salts decreased it. The effect of sodium nitrate was somewhat variable, usually, however, causing a decrease in transpiration. Inorganic acids were found to retard transpiration, while the effect of organic acids was variable. Pyrogallol and tannic acid resembled the action of absorbing agents in causing large increases in the transpiration per unit of green growth.

The effects produced in all cases seemed to be due to the specific action of the ions constituting any given agent. Potassium always showed its inhibiting action on transpiration regardless of whether it was in combination with chlorin, nitric acid, or sulphuric acid. The stimulating effect of calcium was shown in a similar way.

The influence of fermented sugar solutions on the respiration of wheat germs, S. KOSTYTSCHEV (*Biochem. Ztschr., 23 (1909), No. 1–2, pp. 137–142*).—Experiments conducted by the author show that a marked increase in the production of carbon dioxid, without the formation of alcohol, occurred in wheat germs which were previously soaked for 1 to 2 hours in a fermented solution of sugar, and therefore that this increase in carbon dioxid is not due to alcoholic fermentation but to normal respiration in the wheat germs.

The origin and physiological function of pentosans in plants, C. RAVENNA and O. CERESER (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 18 (1909), II, No. 6, pp. 177–183; abs. in Jour. Chem. Soc. [London], 96 (1909), No. 566, II, pp. 1046, 1047*).—An investigation was made of beans in which it was found that there was no marked variation in the quantity of pentosans observed during the period of activity of the chlorophyll. During the night, however, when chlorophyll action was diminished, the variations were considerable, sometimes there being increases while at other times there was a diminution in the amount present. When the carbohydrate food consisted wholly of glucose, administered to the leaves, the amount of pentosans was found to increase greatly, especially when the plants were kept in the light. Whenever the chlorophyll function of the leaves was prevented for a long period the amount of pentosans was found to diminish.

The conclusion is drawn that the simple sugars rather than the complex carbohydrates exert an influence on the formation of pentosans which serve as a reserve material when the plant has exhausted its more readily utilizable substances.

Are amins assimilable by higher plants? M. MOLLIARD (*Compt. Rend. Acad. Sci. [Paris], 149 (1909), No. 17, pp. 685–687; abs. in Jour. Chem. Soc. [London], 96 (1909), No. 566, II, p. 1046*).—In a previous publication (E. S. R.,

10, p. 235) Lutz has reported that maize, cucurbits, etc., were able to utilize amins, directly assimilating them.

The author's experiments were conducted with radishes so grown in tubes as to prevent the presence of micro-organisms. In one series of experiments the plants were supplied with a solution containing all the elements necessary for their nutrition except nitrogen; in a second series calcium nitrate was supplied in addition to the nutrient solution; while the other series contained either ammonium chlorid or the hydrochlorids of methylamin, dimethylamin, ethylamin, and propylamin. Parallel experiments were carried out employing solutions containing 5 per cent glucose.

It appears from the results of these investigations that the plants increased considerably in weight when treated with calcium nitrate or ammonium chlorid. The amins, however, showed a distinctly inhibitory influence on their growth.

Physiological function of hydrocyanic acid in Sorghum vulgare, C. RAVENNA and M. ZAMORANI (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 18 (1909), II, No. 8, pp. 283–287; abs. in Jour. Chem. Soc.* [*London*], *96 (1909), No. 566, II, p. 1048*).—A study was made of the origin of the protein in plants, and the authors consider that the nitrogen is transformed from nitrates to proteins through hydrocyanic acid and amino compounds. In support of this view experiments with plants of *S. vulgare* to which asparagin was given as a nitrogenous food constituent showed that these plants contained considerably less hydrocyanic acid than those to which no asparagin was supplied. The asparagin was considered to have been utilized by the plants, as otherwise they could not have developed for as long a period as 30 to 35 days on the reserve nitrates alone.

Remarks on the immunity of plants, N. BERNARD (*Bul. Inst. Pasteur, 7 (1909), No. 9, pp. 369–386, figs. 7; abs. in Bot. Centbl., 111 (1909), No. 18, pp. 454, 455*).—In previous papers (E. S. R., 22, p. 133), the author has discussed symbiosis as found in the orchids, while in this article an attempt is made to generalize the facts heretofore discovered. In explaining the observations of other investigators on the reaction of plant cells in the presence of fungus or animal parasites, he considers the Rhizoctonia and the orchids as two antagonists, developing their means of attack and defense. The resulting symbiosis represents the immunity realized by the invading fungus on the one hand and the preservation of the essential tissues of the host on the other.

The doctrine of symbiosis. I, The death of oak seedlings due to mycorrhiza, G. A. NADSON (*Zhur. Bolyezni Rast., 2 (1908), pp. 26–40+XI, XII, figs. 4; abs. in Centbl. Bakt.* [*etc.*], *2. Abt., 26 (1910), No. 4–5, pp. 100, 101*).—In certain Russian provinces a large number of one and two year-old oak seedlings were found to be dying. An examination of the rootlets showed that the mycorrhiza fungi, having been unfavorably influenced by external conditions, formed an abnormal growth of hyphæ, which among other things became very much enlarged and, penetrating into the rootlets of the oak seedlings, killed them. It is claimed that in this case a mycorrhiza fungus has acted as a parasite and, therefore, that ectotropic mycorrhiza is really only another form of parasitism.

The spread of the pine mistletoe in Tyrol and the significance of its different varieties, K. VON TUBEUF (*Naturw. Ztschr. Forst u. Landw., 8 (1910), No. 1, pp. 12–39, figs. 16*).—The introduction and spread of the pine mistletoe in Tyrol is claimed to be due to the migratory thrushes distributing the seed during their spring migration northward and not to any of the winter thrushes or other birds that winter over in Tyrol. Successful infection experiments with the mistletoe are recorded for the following trees, namely, *Pinus montana*, *P. laricio*, various species of larches, *Cedrus atlantica*, and other conifers.

Agricultural bacteriology, H. L. RUSSELL and E. G. HASTINGS (*Madison, Wis., 1909, pp. VI+241, figs. 23*).—This book is designed to give a concise, comprehensive treatment of the many and varied relations which bacteria bear to problems of farm life, and from its breadth, compactness, and simplicity should be valuable to those who wish to acquire a general knowledge of the principles of modern agricultural bacteriology.

The book is divided into 5 sections as follows: (1) General bacteriology, in which the structure, growth, and distribution of bacteria and their artificial cultivation are given; (2) relation of bacteria to milk and other dairy products, including contamination, preservation, and fermentation of milk, bacteria in butter and cheese making, and the marketing of milk; (3) relation of bacteria to disease in live stock, its nature, treatment, and prevention, with general directions for the use of various disinfectants; (4) relation of bacteria to the soil; and (5) food preservation and diseases of plants. Under section 4 the effects of bacteria on the mineral elements of the soil, ammonification, nitrification, denitrification, and fixation of nitrogen, bacteria in manure and the best methods of handling it are discussed. In addition the subject of water supply and sewage disposal on the farm is treated under this section, a septic tank suitable for farm purposes being described and figured in detail.

A method of bacteria counting, H. FISCHER (*Centbl. Bakt.* [*etc.*], *2. Abt., 25 (1909), No. 14–18, pp. 457–459*).—Several nutrient media are described, with tables showing the number of bacteria developed on each.

Media for the quantitative estimation of soil bacteria, J. G. LIPMAN and P. E. BROWN (*Centbl. Bakt.* [*etc.*], *2. Abt., 25 (1909), No. 14–18, pp. 447–454*).—The usual gelatin media were rejected on account of their high nitrogen content and rapid liquefaction by certain of the soil bacteria. The alkaline bouillon agar was replaced by a so-called synthetic agar, made up of 1,000 cc. tap water, 10 gm. dextrose, 0.5 gm. dipotassium phosphate, 0.2 gm. magnesium sulphate, 0.05 gm. potassium nitrate, and 20 gm. agar. This forms a slightly acid medium, offers the best conditions for the development of a large number of colonies, and checks the too rapid growth of the spreading colonies, thereby preventing their interference with the development of other species. The optimum of acidity for quantitative estimation of soil bacteria was found to be an acidity equivalent to 5 cc. of normal hydrochloric acid per liter of the medium used and was obtained in the synthetic agar by the use of 0.5 gm. dipotassium phosphate.

Soil bacteriological investigations, C. BARTHEL (*Centbl. Bakt.* [*etc.*], *2. Abt., 25 (1909), No. 1–4, pp. 108–125, fig. 1*).—Previously noted (E. S. R., 21, p. 528) from a Swedish source.

On the occurrence of nitrobacteria in the sea, P. THOMSEN (*Über das Vorkommen von Nitrobakterien im Meere. Inaug. Diss., Univ. Kiel, 1908, pp. 28*).—The author reports the finding of the nitrite organism in samples of ooze from the bottom of the Kiel Fiord but not in the sea water, Plankton, or the fixed algæ. It was also found in similar samples of soil from the vicinity of Helgoland and in slime from the bottom of the bay of Naples, but only in samples taken near the land.

Morphologically the nitrosomonas and nitrobacter from the salt water were not different from those isolated by Winogradski from cultivated soils of western Europe. Physiologically the salt water organism appears to be a form especially adapted to the salt content of its environment. Variations in this salt content retard its oxidizing power. The salt water organism is as dependant upon heat as the nitrobacteria of cultivated soils.

Thermophilous bacteria in the Tropics, E. DE KRUIJFF (*Bul. Dépt. Agr. Indes Néerland., 1909, No. 30, pp. 1–17; Centbl. Bakt.* [*etc.*], *2. Abt., 26 (1910),*

No. 1-3, pp. 65-74).—The author claims that the temperature of the surface layers of the soil in the Tropics is sufficiently high during much of the day to promote the growth of thermophilous bacteria in great numbers and of many species. Several subspecies of *Bacillus thermophilus* are isolated and described.

Some remarks on aerobic nitrogen-fixing bacteria in the Tropics, E. de Kruijff (*Bul. Dépt. Agr. Indes Néerland., 1909, No. 30, pp. 18-21; Centbl. Bakt.* [*etc.*], *2. Abt., 26* (*1910*), *No. 1-3, pp. 54-56*).—In a general examination of tropical soils for nitrogen-fixing bacteria, three species, a Micrococcus and two Bacterium forms, were found and described, and the amount of free nitrogen they were able to fix is given.

The formation and utilization of nitrous oxid by bacteria, M. W. Beijerinck and D. C. J. Minkman (*Centbl. Bakt.* [*etc.*], *2. Abt., 25* (*1909*), *No. 1-4, pp. 30-63, pl. 1, figs. 4; abs. in Jour. Chem. Soc.* [*London*], *96* (*1909*), *No. 566, II, pp. 1043, 1044*).—The formation of nitrous oxid in different media and with various infection materials is given with much detail as to apparatus and methods used, and results obtained.

It was found that when earth was used as infection material in bouillon with from 5 to 12 per cent of nitrates at from 20 to 37° C., it gave a gas volume with more than 80 per cent of nitrous oxid. When the nitrate content was lowered, relatively less nitrous oxid and more free nitrogen was liberated. The most active denitrifying agent in these soil experiments was the polymorphic spore former, *Bacillus nitroxus* and its subspecies. Pure cultures of *B. pyocyaneus*, *B. stutzeri*, and *Micrococcus denitrificans*, in bouillon with a 1 per cent nitrate at 37° gave gas volumes containing from 65 to 75 per cent, 10 per cent, and 20 per cent nitrous oxid, respectively. The nitrate used for the last two was ammonium nitrate and in the case of *M. denitrificans* there was also liberated 42 per cent of free nitrogen. Denitrification by the spore-forming bacteria was more intense in the crude than in the pure cultures.

The experiments relative to the utilization of the nitrous oxid showed that when denitrifying bacteria decompose nitrous oxid under favorable conditions, the nitrogen is liberated and the oxygen appears combined with carbon in the form of carbon dioxid. *B. stutzeri* possesses this characteristic to a high degree. Nitrous oxid can become a source of oxygen to some bacteria, as Spirillum, and prevent the growth of Azotobacter. The bacteria which do not directly denitrify the nitrate can, after other species have decomposed it, break up the resulting nitrous oxid. A new formula as to the chemical reactions occurring in denitrifying processes is proposed.

Two new methods for growing Azotobacter, C. Hoffmann and B. W. Hammer (*Centbl. Bakt.* [*etc.*], *2. Abt., 24* (*1909*), *No. 5-7, pp. 181-183*).—To obtain a large amount of pure Azotobacter, the authors use 8 or 11 inch Petri dishes with a ½ in. layer of agar medium in the bottom. The plates are then inoculated with a heavy suspension of Azotobacter, there being used 10 cc. per plate distributed evenly over the agar and incubated. An abundant growth consisting entirely of Azotobacter is thus obtained which can be scraped off the surface of the agar and used for chemical analysis.

To study the influence of different chemical compounds upon the nitrogen-fixing properties of Azotobacter, a "sand-slope" culture was devised, consisting of from 10 to 15 gm. of sand in a 150 cc. flask, to which is added 20 cc. of the liquid culture medium, and then inoculating with a 1 cc. heavy suspension of Azotobacter. After inoculation the sand is so sloped that considerable of it is above the surface of the liquid culture.

Ammonia and nitrate as a nitrogen source for molds, G. Ritter (*Ber. Deut. Bot. Gesell., 27* (*1909*), *No. 10, pp. 582-588*).—The results of experiments with various ammonium salts and nitrates as a source of nitrogen for species

of Mucor, Rhizopus, Aspergillus, Cladosporium, Botrytis, and Thamnidium are given.

A nitrogen fixing yeast (Torula wiesneri), H. ZIKES (*Sitzber. K. Akad. Wiss. [Vienna], Math. Naturw. Kl., 118 (1909), I, No. 7, pp. 1091–1133; abs. in Centbl. Bakt. [etc.], 2. Abt., 26 (1910), No. 4–5, pp. 91, 92*).—The author claims to have isolated from laurel leaves a yeast which is able to fix free nitrogen, and to which is given the name *T. wiesneri.* The isolation was accomplished on a hard agar medium, consisting of a 2 per cent grape sugar solution and 0.02 per cent potassium phosphate. This nutrient medium had only a slight nitrogen content, nevertheless it is claimed that for every gram of sugar consumed the yeast fixed 2.3 to 2.4 mg. of nitrogen.

The behavior of the fungus on different media and its morphological characters are described. Several other yeasts were also isolated on glucose agar, none of which were nitrogen fixers.

The morphological and biological significance of the root tubercles of the Leguminosæ, P. VUILLEMIN (*Bul. Soc. Sci. Nancy, 3. ser., 10 (1909), No. 1, pp. 30–45*).—This is a general review of the literature and of the theories of various investigators on the biological and morphological characters of the root tubercles of the Leguminosæ.

Observations on the growing of nitrogen-fixing plants (clover) with non-leguminous plants by sowing mixed seed, B. TACKE (*Prakt. Bl. Pflanzenbau u. Schutz, n. ser., 7 (1909), No. 12, pp. 154–156*).—It is claimed that on high moorlands the use of a mixture of clover and grass seed for grass meadows has proved highly satisfactory.

FIELD CROPS.

Improvement of pastures in eastern New York and the New England States, J. S. COTTON (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 49, pp. 10, pls. 2*).—This circular, which supplements Farmers' Bulletin 337 previously noted (E. S. R., 20, p. 571), points out some of the fundamental principles in the improvement of the deteriorated pastures of eastern New York and the New England States, where close grazing checks the growth of perennial plants, diminishes the supply of humus, and makes the ground too dry for the maintenance of native forage plants. Dairy and beef pastures are contrasted, and early grazing, close grazing, overgrazing, and means of overcoming their unfavorable results by fertilizing, cultivation, reseeding, eradication of weeds, and other practices are discussed.

Food grasses of southwest Africa, R. PILGER (*Notizbl. K. Bot. Gartens u. Mus. Berlin, 1910, No. 46, pp. 133–155, figs. 12*).—A general botanical discussion of food grasses in southwest Africa is followed by a description of each of the more important varieties with a statement as to their geographical distribution and economic properties.

Results of cooperative tests of varieties of corn, wheat, oats, soy beans, and cowpeas, 1909, A. T. WIANCKO and C. O. CROMER (*Indiana Sta. Bul. 139, pp. 89–123, fig. 1*).—This bulletin reports the results of a continuation of variety tests previously noted (E. S. R., 21, p. 35).

During 1909, experiments were conducted on over 900 farms, from 3 to 12 being located in each county. The yields are reported by sections ranging from section 1 in the northwest corner of the State to section 12 in the southeast corner. During the period 1906–1909, inclusive, the yields per acre of the leading varieties of corn in the various sections have been, respectively, as follows: Section 1, Silver Mine and Early Yellow Dent, 50.8 and 50 bu.; section 2, Silver Mine, Anson White Dent, and Dunn Yellow Dent, 57.5, 54.7, and 54.7 bu.; section 3, Reid Yellow Dent and Hudson Leaming, 57.6 and 55.5 bu.; section 4,

Reid Yellow Dent and Hudson Leaming, 60.9 and 58.9 bu.; section 5, Boone County White Dent and Leaming, 57.5 and 57 bu.; section 6, Boone County White Dent and Reid Yellow Dent, 66.3 and 66.1 bu.; section 7, Boone County White Dent and Pride of Indiana, 58.6 and 57.4 bu.; section 8, Johnson County White Dent and Pride of Indiana, 54.1 and 51.4 bu.; section 9, Johnson County White Dent and Vogler White Dent, 61.6 and 58.9 bu.; section 10, Johnson County White Dent and Alexander Gold Standard, 60.4 and 57.1 bu.; section 11, Johnson County White Dent and Vogler White Dent, 52.9 and 50.7 bu.; and section 12, Johnson County White Dent and Vogler White Dent, 48.5 and 46.8 bu.

A summary of all the winter wheat variety tests conducted during the last 4 years shows that the highest average yields of 22 and 21.2 bu. per acre were produced by Michigan Amber and Dawson Golden Chaff. During the same period Great Dakota and Silver Mine oats produced 34.9 and 34.8 bu. per acre, respectively. Hollybrook soy bean produced 2,728 lbs. of hay and 20 bu. of grain per acre in northern Indiana and in southern Indiana 2,348 lbs. of hay and 14.4 bu. of grain. In the southern section it was excelled by Medium Early Yellow with a yield of 2,690 lbs. of hay and 15.2 bu. of grain. Early Blackeye cowpeas produced 2,346 lbs. of hay and 10.2 bu. of grain per acre in southern Indiana and 3,252 lbs. of hay and 12.1 bu. of grain in the northern section, where it was excelled by Michigan Favorite with yields of 3,585 lbs. of hay and 13.5 bu. of grain per acre.

During the year under report, irregular or unsatisfactory tests were discarded and the data from the remainder are summed up in the following table:

Average yields of varieties of corn, by sections, 1909.

Varieties tested.	Sections and average yields of varieties in bushels per acre.											
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*
Early Yellow Dent	49.2	55.8		53.8	50.9							
Wabash Yellow Dent	49.9	54.7	54.1									
Dunn Yellow Dent	47.9	55.9										
Anson White Dent	50.7	55.6										
Silver Mine	51.8	58.7										
Hayhurst Yellow Dent	44.4	52.4										
Riley Favorite			55.2	53.7	53.5	59.0	57.7					
Reid Yellow Dent			61.6	62.7	59.4	67.7	59.1	51.9		61.5		
Hudson Leaming			61.1									
Pulaski County Golden Dent			53.8	56.2		60.1						
Leaming				57.9	60.5	65.6	60.6	53.2				
Boone County White					59.5	68.7	61.8	54.9				
Pride of Indiana							58.6	53.4	61.8	62.3	47.7	44.2
Johnson County White Dent								57.6	67.6	64.2	52.0	47.1
Vogler White Dent									62.6	62.2	48.3	46.7
Alexander Gold Standard									60.9	62.1	48.5	48.3
Johnson County Yellow Dent									59.0		46.9	46.3
Number of test farms	16	54	16	25	26	23	21	24	25	15	47	29

Variety tests, A. M. TENEYCK (*Kansas Sta. Circ. 6, pp. 6*).—This circular gives very briefly notes based on variety tests covering a period of 5 to 7 years, as to the varieties best adapted to eastern and middle Kansas conditions. More than 200 varieties or strains of corn, 44 of oats, 32 of barley, 6 of sorghum, 2 of Kafir corn, 2 of broom corn, as well as 1 or more each of milo maize, spring emmer, cowpeas, soy beans, and millet have been tested.

Variety tests of oats, barley, wheat, and rye, F. W. TAYLOR (*New Hampshire Sta. Bul. 145, pp. 141–153*).—In 1904, in a test of 13 varieties of oats no

kernels matured on account of rust, but Mold Black and Improved Prize Cluster produced the highest yields of straw. Rust and smut of oats are discussed and the formalin treatment for oats outlined. The more noteworthy results of variety tests conducted are summarized in the following table:

Results of variety tests with small grains.

Type of soil.	Grain.	Total number of varieties.	Varieties making best yield.	Years tested.	Yield per acre, Grain.	Yield per acre, Straw.	Weight per bushel of grain.	Remarks.
					Bu.	*Lbs.*	*Lbs.*	
Clay loam	Oats	8	Welcome	1906	38.10	3,060	39.50	Much rust.
Do	do	8	Long White Tartar	1906	35.30	2,390	40.50	Some rust.
Clay	do	9	do	1907	68.70	2,540	32.00	Do.
Do	do	9	Hamilton	1907	68.10	3,510	34.50	Do.
Clay loam	do	12	Kherson	1908	34.60	1,350	28.00	Little rust.
Do	do	12	Long White Tartar	1908	31.50	2,097	33.50	Rust slight.
Clay	do	9	Welcome	1909	40.00	1,507	32.50	Side oat.
Do	do	9	King	1909	39.00	1,560	30.50	Do.
———	do	6	Long White Tartar	1904–1909	42.10	2,092	34.40	
———	do	6	Hamilton	1904–1909	39.30	2,316	33.10	
Heavy clay	Barley	4	2-Rowed Brewing	1908	22.88	2,580	53.00	
Stony loam	do	5	Beardless	1909	29.06	1,710	34.50	
———	Wheat	1	Dawson Golden Chaff.	1906–1909	20.85	1,955	60.30	
Clay and loam	do	2	Fife and Blue stem	1907–1909	16.00	1,783	58.75	
Clay	Rye			1908–1909	19.20	2,271	56.20	

[Variety tests of wheat and corn], C. WILLIS (*South Dakota Sta. Rpt. 1909, pp. 19–21*).—Among 20 varieties of durum wheat, averaging 21.25 bu. per acre, the highest yield, 32.25 bu. per acre, was produced by Arnautka. Blue Stem and Red Fife produced the highest yields, 18.88 and 17 bu. per acre, respectively, among 10 varieties of wheat, averaging 14.19 bu. per acre. Among 15 varieties of corn tested in cooperation with this Department, Minnesota No. 13 produced the maximum yield, 62.35 bu. per acre, the average of all varieties being 39.75 bu.

[Experiments with field crops] (*Dept. Agr. and Tech. Instr. Ireland Jour., 10 (1910), No. 2, pp. 279–354*).—Applications of 6 cwt. of kainit, of 1¼ cwt. of muriate of potash, of 1¼ cwt. of sulphate of potash, and of 3 cwt. of kainit mixed with 2½ cwt. of rape meal per acre, have produced profits when applied to flax during periods of 4 to 8 years ended with 1908, with the exception of kainit and muriate of potash, which gave losses in 1902. Applications of (1) 3 cwt. of kainit, 3 cwt. of superphosphate and ½ cwt. of sulphate of ammonia and (2) 3 cwt. each of kainit and superphosphate produced losses during each of the 4 years, 1901 to 1904, inclusive. Applications of 4 cwt. of salt, of 5 cwt. of rape meal, and 5 cwt. of basic slag during 1902 and 1903 did not produce a profit in any instance.

During the years 1905 and 1908, inclusive, applications of kainit, muriate of potash, and sulphate of potash singly and of a mixture of kainit and rape meal made in winter were compared with similar applications made at the time of planting. The average returns from the spring applications showed a net profit of £1 12s. with kainit, of £1 9s. with muriate of potash, and of £1 4s. 7d. with sulphate of potash. A dressing of 1¼ cwt. of muriate of potash proved as efficacious with the flax crop as one of 6 cwt. of kainit. The average net profits from the winter application of kainit were £1 11s. 10d. per acre and from the spring application £1 18s. 1d.; from muriate of potash, £2 3s. 3d. and £1 16s., respectively. The average net profit from the application of kainit and rape meal during the 4 years under consideration was £2 2s. 2d.

In a variety test Pernau Crown and Vladimir produced the highest net returns among 5 varieties of Russian flax seed tested, while at 5 centers Pernau Crown gave a higher yield of straw and scutched fiber than did the Belfast brand, the average difference amounting to £1 7s. 5d. per acre. Irish saved seed, selected from long stalks, produced returns from flax and tows £2 9s. 5d. greater than those obtained from seed not selected, while Pernau Crown seed produced still greater returns. Earlier work with flax has been previously noted (E. S. R., 20, p. 636).

In 1906, freshly imported Danish Archer barley, and the same variety grown in Ireland one year proved practically equal as seed. In 1907, the Irish Archer produced a yield surpassing that of Danish Archer by 98 lbs., but in 1908 and 1909, the two were again practically equal. The most profitable fertilizer for most barley soils was 1 cwt. sulphate of ammonia, 3 cwt. superphosphate, and 3 cwt. kainit per acre.

On meadows the use of nitrate of soda and of 10 tons of farmyard manure proved unprofitable. The heaviest yield was obtained from an application of 1 cwt. nitrate of soda, 2 cwt. superphosphate, and 2 cwt. kainit per acre. The nitrate of soda should be applied early in April, the remainder of the formula during the preceding February.

The greatest profits with potatoes were secured from an application of 15 tons of farmyard manure, 1 cwt. sulphate ammonia, 4 cwt. superphosphate, and 1 cwt. muriate of potash per acre. In a variety test the main crop varieties, Factor and Up-to-Date, and the midseason variety Windsor Castle produced yields of 13 tons or more per acre. Sprouted seed produced an average yield of $2\frac{1}{4}$ tons per acre more than did unsprouted seed in 338 tests, extending over a period of seven years.

A manurial test with mangels conducted on 33 different farms in 21 counties indicated that the most profitable application was 20 tons of farmyard manure, 4 cwt. superphosphate, 2 cwt. sulphate of ammonia, 4 cwt. salt, and 2 cwt. nitrate of soda, per acre, while with oats, the most profitable application appeared to be 1 cwt. sulphate of ammonia, 3 cwt. superphosphate, and 3 cwt. kainit.

For turnips, 20 tons of farmyard manure per acre is regarded as the standard dressing, but this amount may be reduced to 10 tons if supplemented by 4 cwt. superphosphate, 1 cwt. sulphate of ammonia, and 3 cwt. of kainit. Basic slag may be substituted for superphosphate and is recommended where the disease finger-and-toe (*Plasmodiophora brassicæ*) is prevalent.

In a variety test of wheat, Squarehead Master and White Stand Up proved approximately equal in yield, while Red Fife produced the highest quality of flour but the lowest average yield per acre.

The average yields in fertilizer tests conducted at a number of centers is shown by the following table:

Table of results of tests with four nitrogenous manures.

Fertilizer.	Amount per acre.[a]		Crop yield.									
			Oats.			Potatoes.		Turnips.		Mangels.	
			Grain.		Straw.						
	Cwt.	*Qrs.*	*Cwt.*	*Qrs.*	*Cwt.*	*Tons.*	*Cwt.*	*Tons.*	*Cwt.*	*Tons.*	*Cwt.*
Sulphate of ammonia	1	0	26	2	47	12	6	25	3	32	10
Nitrate of soda	0	$1\frac{1}{3}$	25	2	50	12	2	26	6	31	14
Calcium cyanamid	1	0	27	0	44	12	15	26	3	30	3
Nitrate of lime	1	2	27	0	48	12	10	24	17	32	17

[a] These amounts were doubled in the tests with mangels.

Root crops, F. GILLANDERS (*New Zeal. Dept. Agr., Leaflets for Farmers, No. 80, pp. 11*).—Directions are given for manuring, growing, and cultivating root crops in New Zealand, with a special discussion of turnips, mangolds, kohlrabi, carrots, and parsnips.

Winter and spring work in selecting seed corn, W. A. GRAHAM (*N. C. Dept. Agr. Spec. Bul., 1910, Jan., pp. 10, figs. 3*).—This bulletin presents information designed to assist in the selection of seed corn. Score cards of 12 States are presented in parallel columns for purposes of comparison.

Some lessons from the corn shows, H. GARMAN (*Kentucky Sta. Bul. 145, pp. 271–290, pls. 6*). Good ears of corn and some deviations from desirable types for Kentucky are illustrated by photographs and the different points of the score card discussed in full. Standards of perfection for 8 varieties are presented in parallel columns and suggestions made for the preparation and display of corn exhibits. A bibliography on corn improvement is appended.

Paspalum dilatatum, H. W. POTTS (*Dept. Agr. N. S. Wales, Farmers' Bul. 8, pp. 25, figs. 4*). *Paspalum dilatatum* proved a succulent and palatable food for all kinds of stock at seasons when most grasses are dry and for the same reason gives promise of usefulness as a fire break. Its deep rooting habit confers drought resistance. Directions for harvesting, testing, and judging the seed are outlined. A botanical description and discussion of the plant and analyses of the hay are given.

Three much misrepresented sorghums, C. R. BALL (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 50, pp. 14, figs. 2*).—The results obtained by experiment stations and other information likely to assist farmers in determining the value of shallu ("California wheat"), "chocolate corn," and gooseneck sorgo ("Texas seeded ribbon cane"), are presented. Their history, botanical relationship, yields, the feeding value of their grain and forage, and other crop characters are discussed with special reference to extravagant claims made for these crops by seedsmen and others.

Possibilities of the sweet potato in Macon County, Alabama, G. W. CARVER (*Alabama Tuskegee Sta. Bul. 17, pp. 5–19, figs. 8*).—The origin and history of the sweet potato are briefly stated, varieties discussed, climatic and soil requirements outlined, and directions given for seed selection, the construction of the plant bed, the making of vine cuttings, the preparation of the land, planting, fertilizing, harvesting, and storing, together with notes on insect enemies and fungus diseases, and recipes for canning and for preparing of numerous dishes.

In a 30-day feeding trial in which from 2.75 to 3.5 lbs. of sweet potatoes were substituted for 1.5 lbs. of corn in the rations of 4 mules, the mules looked as well and were able to do as much work as 4 check mules. Hogs fed 8 lbs. of sweet potatoes per day made a total gain of 24.5 lbs. in 28 days as compared with gains of 33 and 53.5 lbs. made by hogs fed on shorts and corn, respectively.

Tobacco growing in Ireland, G. N. KELLER (*Dept. Agr. and Tech. Instr. Ireland Jour., 10 (1910), No. 2, pp. 270–278*).—A general discussion is given of the work in 1909 at the same centers and upon the same areas as in 1908.

Fifty-six varieties were tried of which 8 were imported seed, but none of these showed commercial superiority. In connection with the 16 varieties grown commercially, field and soil conditions, rotation, preparation of land, manuring, planting and cultivation of the experimental crops are outlined and notes given on topping and suckering, ripening, harvesting, curing, seed saving, insects and diseases, grading, packing, and marketing. Tables show the expenses, yields per acre, and prices secured for various types of tobacco grown at the different centers during 1908.

Tri-local experiments on the influence of environment on the composition of wheat, J. A. Le Clerc and S. Leavitt (*U. S. Dept. Agr., Bur. Chem. Bul. 128, pp. 18*).—Following a résumé of the results of previous experiments on the effect of environment upon the composition of cereals, analyses are given of the original seed of Crimean wheat grown in Kansas in 1905; of the 1906 crop in Kansas, California, and Texas from the Kansas seed; of the 1907–8 crops grown in Kansas, California, and Texas from seed from all three sources; and of the 1909 crop grown in California from Kansas and from California seed. The Texas crop was a failure in 1908 and during the same year the Kansas crop grown from California seed was lost. Similar analyses are given of the original seed of Kubanka wheat grown in South Dakota in 1905; of the 1906 crop grown in Kansas, California, and South Dakota from the South Dakota seed; and of the 1907–8 crops grown in Kansas, California, and South Dakota from seed from all three sources. The analyses show the percentage of protein, ash, phosphoric acid, fat, fiber, pentosans, sugars, alcohol-soluble nitrogen, and salt-soluble nitrogen, the weight per thousand grams and per bushel, and the percentage of flinty kernels. The greatest variations are in the percentage of nitrogen, the weight per thousand grams and per bushel, and the percentage of flinty grains.

The influence of acclimation, heredity, and soil are discussed. Tabulated data show the influence of the soil on the composition of acclimated and nonacclimated seed from the same source. It is found not always true that large berries, though low in percentage of nitrogen, contain as much nitrogen per berry as the smaller grains.

From the data obtained the following conclusions are drawn:

"Wheat of the same variety obtained from different sources and possessing widely different chemical and physical characteristics, when grown side by side in one locality, yields crops which are almost the same in appearance and in composition. Wheat of any one variety, from any one source, and absolutely alike in chemical and physical characteristics, when grown in different localities, possessing different climatic conditions, yields crops of very widely different appearance and very different in chemical composition. These differences are due for the most part to climatic conditions prevailing at the time of growth. The results so far obtained would seem to indicate that the soil and seed play a relatively small part in influencing the composition of crops. The practice of trying to improve crops in one locality, which crops are to be grown in another locality of widely different climatic conditions, should be discouraged. Crops should be improved in the locality in which they are intended to be grown, or the seed should be selected from a region which has similar climatic conditions."

Wheat hybridization, R. W. Thornton (*Agr. Jour. Cape Good Hope, 36 (1910), No. 1, pp. 15–18, figs. 6*).—An account is given of the crosses conducted under the supervision of the manager of the Robertson Experiment Station for the purpose of securing rust resistance, high yield, and good milling quality. The combinations made were Darling X Van Niekerk and Gluyas X DuToit. From each cross 3 promising hybrids were retained for further test.

Annual variations in the character of Central Provinces wheats, G. Evans (*Dept. Agr. Cent. Prov. and Berar* [*India*], *Bul. 3, pp. 13*).—Irrigation on black soil softened durum and hard bread wheats to a marked degree and therefore probably reduced their strength. The application of farmyard manure had no apparent tendency to change the percentage of hard kernels. A sandy silt soil, even when irrigated 4 times, produced wheat having from 89 to 95 per cent of hard kernels and in only one instance any soft kernels whatever, while black

clay with one irrigation produced yields of the same varieties containing from 34 to 87 per cent of hard kernels and from 2 to 29 per cent of soft kernels.

A suggestion regarding heavy and light seed grain, L. R. WALDRON (*Amer. Nat., 44 (1910), No. 517, pp. 48–56*).—Some unreduced data from Bulletin 78 of the Bureau of Plant Industry of this Department, previously noted (E. S. R., 17, p. 552), as well as other material, are thrown into the form of correlation tables in this article. For winter wheat the coefficients of correlation were as follows: Average weight of grains subject, average number of grains per head relative, -0.115 ± 0.31; average weight of grains subject, average length of culm relative, 0.16 ± 0.034; average weight of grains subject, average volume of grains relative, 0.896 ± 0.005, the coefficients of variability for a number of grains, 54.5 ± 2.33; average weight of grains, 14.5 ± 0.48; length of head, 19.7 ± 0.68, length of culm, 14.2 ± 0.47. For oats the coefficients of correlation were as follows: Average weight of grains subject, average number of grains per head relative, -0.595 ± 0.013; average weight of grains subject, average length of head relative, -0.511 ± 0.015; average weight of grains subject, average length of culm relative, -0.404 ± 0.017; average weight of grains subject, average number of grains per head relative, -0.115 ± 0.031.

It is noted that "the correlations given of winter wheat hold about the same relations to each other as do the corresponding correlations of the oats." The correlation shown between the average weight of kernel and the average volume per kernel was almost perfect.

Seed commissioner's branch, S. A. FISHER (*Rpt. Min. Agr. Canada, 1909, pp. 14–22*).—The results of germination tests of 713 samples, mainly of vegetable seeds, are given in tabular form. Numerous other samples of grain, clover, timothy, grass, and miscellaneous seeds were tested at the Ottawa and Calgary seed laboratories, the samples received being mainly from Canadian provinces and from Great Britain. Seed fairs and field crop competitions are also reported.

The purity of the principal grains tested is indicated by the following table:

Number of seeds of noxious weeds in small grains.

Kind of grain.	Number of noxious weed seeds.			
	None.	Not over 1 per pound.	1–5 per pound.	Over 5 per pound.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*
Recleaned wheat (about 545 cars)	27.0	31.0	30	12
Oats from western Canada	8.0	8.0	32	52
Barley	2.5	32.5	55	10

Carbon bisulphid for killing weeds, E. V. WILCOX (*Hawaii Sta. Press Bul. 25, pp. 4*).—Carbon bisulphid was poured upon the stems of numerous plants about 6 in. above the surface of the ground. In most instances no effect appeared until after a lapse of a considerable period. On Crotalaria, the death of the plant, root, and branches was produced within 4 to 10 days. Oi and Lantana bushes 2 in. in diameter died in 17 to 32 days. Young prickly pear plants fell over on the ground in some instances within 24 hours, and in others were dead within 2 days. No visible effect was produced upon guavas for a period sometimes as great as 2 or 3 months, but the plants almost invariably eventually withered and finally died. These results were apparently due both to artificial freezing and to a poisonous action of the carbon bisulphid resulting in the complete destruction of the roots. A brief list of articles covering similar work is given.

HORTICULTURE.

Rational handling and marketing of horticultural crops, G. LIND (*K. Landtbr. Akad. Handl. och Tidskr., 49 (1910), No. 1, pp. 81–106, figs. 7*).—A discussion of the above subject from the standpoint of the Swedish horticulturist.

The production of horticultural varieties, H. DE VRIES (*Jour. Roy. Hort. Soc. [London], 35 (1910), No. 3, pp. 321–326, figs. 9*).—A paper on this subject delivered before the Royal Horticultural Society in which the author describes several cases of experimental production of varieties.

On variation through grafting and asexual hybridization, E. GRIFFON (*Rev. Vit., 33 (1910), No. 849, pp. 318–320*).—During the past five years the author has conducted an extensive series of grafting experiments with herbaceous plants similar to those of Daniel (E. S. R., 17, p. 1070). His results for the 5-year period as a whole confirm those reported from time to time (E. S. R., 21, p. 544). Very few morphological or biological variations were noted and those were not well marked. No cases were observed of the specific influence of the stock on the scion, of any alteration of the fundamental character of species, or of asexual hybridization.

The physiology of pruning, E. A. BUNYARD (*Jour. Roy. Hort. Soc. [London], 35 (1910), No. 3, pp. 330–334*).—In this paper the author briefly considers the practice of pruning and its relation to the vital processes of plants.

The influence of the rainy season of 1909 on the growth of various vegetables, DENAIFFE (*Jardin, 24 (1910), No. 554, pp. 86, 87*).—This consists of brief notes on the influence of the severe rainy season of 1909 on the growth behavior of a number of the vegetables under test in the experimental gardens of the Denaiffe establishment in France.

Onion tests, 1905–1909, F. GARCÍA (*New Mexico Sta. Bul. 74, pp. 24, figs. 6*).—This is a further report on cultural experiments with onions (E. S. R., 16, p. 1076) including trials of sodium nitrate and of manure as affecting the yields, observations on the hardiness of young onions, transplanted *v.* spring field-sown onions, and tests of the Denia onion, the mild variety annually imported in large quantities from Spain. The Giant Gibraltar, a large, mild, Spanish variety, was the kind used in the general tests.

The nitrate of soda was used at the rates of 200, 300, 400, 500, and 600 lbs. per acre, the plats being generally one-twenty-fifth acre in size. The manure was applied at the rate of 50 loads per acre. All the fertilizers increased the yields. The average estimated annual yield per acre for five years on the check plats was 35,390 lbs. Nitrate of soda applied at the rate of 600 lbs. per acre in 4 applications gave the next lowest yield. The same quantity of nitrate of soda applied in 2 applications gave the highest yield of the nitrate plats or about 50 per cent increase over the checks, while manure gave a 61 per cent increase over the checks.

The results indicate that while transplanted onions give the largest yields, good crops may be raised from early field planted seed. From September 25 to the end of the first week in October is given as the best time to sow seed in the fall. When seed can not be sown in the fall, it is recommended that it be sown in the field about January 20 to February 10 in rows 15 in. apart, thinning the plants to 4 in. in the rows. The later the planting the smaller and more inferior the crop of onions. The cost of production during these tests was somewhat less than that previously reported, not exceeding $90 per acre.

The Denia onions, which were found practically identical with the Giant Gibraltar, proved to be well adapted to climatic and soil conditions at the sta-

tion, growing very large and yielding heavily. A carload of these onions shipped to Chicago sold as well as the imported Spanish variety.

It was found that young onion seedlings will stand a minimum temperature of 9° F. above zero without injury, but that a zero temperature may kill some of them.

Chemical fertilizer experiments with truffles, E. ZACHAREWICZ (*Rev. Vit.*, *33* (*1910*), *No. 850*, *pp. 350–353*, *fig. 1*).—The author points out that the use of organic fertilizers appears to decrease instead of increase the yield of truffles, and cooperative experiments were conducted with a number of truffle growers to determine whether chemical fertilizers would have the same effect.

The data secured indicate that a complete fertilizer composed of nitrate of soda, potassium chlorid, and superphosphate of lime increases the yield to a profitable extent and that these three ingredients improvė the size, form, and perfume of the truffles. Nitrate of soda used alone hastens maturity. The conclusion is also reached that when chemical fertilizers are used the truffle industry may be pursued in conjunction with grape growing.

Strawberry culture with descriptions and lists of varieties, W. T. MACOUN (*Canada Cent. Expt. Farm Bul. 62*, *pp. 53*, *pls. 2*, *figs. 2*).—Popular directions are given for the propagation and field culture of strawberries, including varietal descriptions and informations relative to the quality, productiveness, and general usefulness of the newer varieties in comparison with the best of the older varieties, based on tests conducted at the Central Experimental Farm. Remedies are also suggested for the more common diseases and injurious insects to which strawberry plants are subject. The bulletin concludes with a list of the varieties tested at the Central Farm from 1887 to 1909 with notes on their character.

Pineapple growing in Porto Rico, H. C. HENRICKSEN and M. J. IORNS (*Porto Rico Sta. Bul. 8*, *Spanish Ed.*, *pp. 7–48*, *pls. 6*).—The English edition of this bulletin has been previously noted (E. S. R., 21, p. 45).

The American grapes employed as stocks for reconstituting phylloxera-infested vineyards in Italy, C. FUSCHINI (*Le Viti Americane nella Pratica della Ricostituzione dei Vigneti Fillosserati in Italia. Parma*, *1910*, *pp. XIX+141*, *figs. 8*).—A small practical treatise on viticulture with special reference to the use of the American species as stocks for native grapes. In the introduction consideration is given to the phylloxera infestation in Europe and the nature of the trouble, methods of combating it, etc. Succeeding chapters contain descriptions of the best graft stocks and their principal cultural requirements, together with specific directions for growing the American species, including their propagation, grafting, forcing the grafted vines, and planting operations. A short bibliography on viticulture is appended.

On the use of lime nitrogen in vineyards, F. MUTH (*Weinbau u. Weinhandel*, *28* (*1910*), *No. 13*, *p. 120*).—Lime nitrogen was tried in a vineyard in Oppenheim in comparison with the usual sources of nitrogen, such as nitrate of soda and ammonium sulphate. The data secured indicate that lime nitrogen may safely be used as a source of nitrogen in vineyards.

On the phosphoric acid content of grapes during their period of development, E. HUGUES (*Prog. Agr. et Vit.* (*Ed. l'Est-Centre*), *31* (*1910*), *No. 14*, *pp. 418–424*, *figs. 3*).—Analyses are reported in which the author traces the development of phosphoric acid in the skin, pulp, and seeds of grapes throughout the active growing and ripening periods.

Comparative results of inquiries made in 1907 and in 1909 on the viticultural situation in the department of Herault, E. DURAND (*Prog. Agr. et*

Vit. (Ed. l'Est-Centre), 31 (1910), No. 11, pp. 324, 325).—A comparative statistical review of viticultural conditions in Herault for the years 1907 and 1909.

On the cost of producing wines in Tuscany, D. TARUFFI (*Bol. Ist. Agr. Scandicci, 2. ser., 7 (1909), No. 3, pp. 219–251*).—An economic study relative to the cost of growing grapes and producing wines in Tuscany, based upon detailed data on the expense of various cultural and vintage operations in different sections of Tuscany.

Orchard planting plans, J. CRAIG (*West. N. Y. Hort. Soc. Proc., 55 (1910), pp. 67–76, figs. 3*).—A discussion of the various methods of planting orchards, in which the author points out the need of making the planting methods conform to the character of the tree, relative to its habit of growth, habit of bearing, longevity, size, etc.

Problems in the pollination of fruits, S. A. BEACH (*Trans. Ill. Hort. Soc., n. ser., 43 (1909), pp. 67–77*).—A paper on this subject with the accompanying discussion, including a bibliography of the literature of orchard pollination.

Experiment in orchard irrigation, F. L. LAMSON (*West. N. Y. Hort. Soc. Proc., 55 (1910), pp. 49–59, figs. 5*).—This paper with the accompanying discussion deals with an experiment undertaken by the author in the irrigation of peaches in Wayne County, N. Y.

As a result of the first year's trial, the peaches on the irrigated trees were from one-third to one-half larger than on the unirrigated plats. They also had a richer color, the new wood was more mature, the foliage a much darker and richer green, and the flavor compared favorably. The irrigation gave an added profit of $158 per acre.

Protecting orchards against frosts and freezes, W. L. HOWARD (*Missouri Sta. Circ. Inform. 35, pp. 10*).—A popular review of some of the methods employed in protecting orchards from frost in various fruit growing districts, with a discussion of the practicability of using orchard heaters under Missouri conditions.

What are the profits from the orchard industry? A. JANSON (*Österr. Gart. Ztg., 5 (1910), Nos. 2, pp. 47–55; 3, pp. 86–90; 4, pp. 131–142, fig. 1*).—A detailed examination of the cost of growing and maintaining fruit orchards and the yields and returns to be expected therefrom, with special reference to German conditions.

Fruit growing, storage, and marketing in the United States, N. KAUMANNS (*Deut. Obstbau Ztg., 1910, No. 9–10, pp. 105–111*).—A descriptive account of American methods of fruit growing, storage, transportation, and marketing.

California fruits and how to grow them, E. J. WICKSON (*San Francisco, Cal., 1910, 5. ed., rev., pp. 604, figs. 173*).—The present edition of this work, which has been previously noted (E. S. R., 20, p. 838), includes the more recent knowledge relative to California horticulture.

Better fruit for Maine, E. F. HITCHINGS (*Bul. [Maine] Dept. Agr., 9 (1910), No. 1, pp. 28, pls. 13*).—Considerable information on the culture and care of apple orchards has been brought together in this bulletin with the view of stimulating the orchard industry in Maine.

Early horticultural days in Oregon, J. R. CARDWELL (*Proc. Oreg. State Hort. Soc., 24 (1909), pp. 67–74, fig. 1*).—This paper contains considerable general information relative to the history and development of the fruit industry in Oregon.

Elementary facts concerning orchard practice in Wisconsin (*Wis. State Hort. Soc. Bul. 18, pp. 15, figs. 7*).—This bulletin contains brief popular directions for growing orchard and small fruits.

Fruit growing (*Rpt. Scot. Com. Agr. Canada, 1908, pp. 158–171, figs. 7*).—This is a report of the Scottish Agricultural Commission of 1908 relative to the

progress and prospects of fruit growing in the Annapolis Valley, Nova Scotia, in Niagara Peninsula, Ontario, and in different parts of British Columbia.

On the yields, market conditions, and prices of German fruit crops for the year 1909, the import of foreign fruits and their influence upon the price and sale of native fruits, and the results of fruit exchanges and markets, E. LESSER (*Deut. Obstbau Ztg., 1910, No. 7–8, pp. 89–96*).—A report to the German Pomological Society on the fruit crops and market conditions in 1909.

Second report on the fruit experiments at Pusa, A. HOWARD (*Agr. Research Inst. Pusa [India] Bul. 16, 1910, pp. 26, pls. 5, figs. 3*).—In a previous report (E. S. R., 19, p. 338), an outline was given of cultural experiments with orchard fruits begun by the Agricultural Research Institute at Pusa. The present report deals with the results thus far obtained, including an account of the general experience gained in fruit growing on the plains of India.

Apple growing in New England, C. D. JARVIS (*Connecticut Storrs Sta. Bul. 61, pp. 55–89, pls. 10*).—Part 1 of this bulletin discusses the apple industry in New England relative to its rise and fall, present conditions, and outlook for its future development. Part 2 contains suggestions relative to the renovation of old orchards, concluding with an example of successful renovation. The recommendations suggested are based upon the observations and investigations of various workers and upon the results of field study, embodying the experiences of successful fruit growers.

Apple culture under irrigation, F. GARCÍA (*New Mexico Sta. Bul. 75, pp. 3–44, figs. 14*).—This bulletin deals with apple culture under irrigation, the suggestions being based largely on observations and experiments in the Rio Grande Valley.

The important phases discussed include selection of site, soil, preparation of the land, selection of varieties, source and care of the trees, planting operations, cultivation, pruning, intercropping, mixed orchards, winter injury, varieties, insects, insecticides, and protecting trees from rabbits during winter. Lists are given of varieties recommended for different apple growing districts of New Mexico, together with tabulated data from a number of apple growers relative to various orchard operations. The 4 commercial varieties of New Mexico are given as Ben Davis, Missouri Pippin, Arkansas Black, and Mammoth Black Twig or Arkansas.

Olive culture and oil manufacture in the arid Southwest, J. E. COIT (*Arizona Sta. Bul. 62, pp. 525–555, figs. 3*).—The first part of this bulletin contains detailed suggestions for growing olives in Arizona, including a discussion of climate, soil, irrigation, propagation, planting, pruning, budding, cultivation, insects and diseases, yields, and the outlook for olive products.

There follows a detailed account of experiments in oil making conducted with a Buchner press at the station farm, one of the purposes of which was to determine the quality of oil made under the best conditions from Arizona grown olives. The olives were secured from orchards growing on rather heavy well irrigated land, on light gravelly soil of the foot hills, and on very thin dry mesa soil. The samples of olives were pressed 3 times and in a few cases 4 times, a pressure from 300 to 400 lbs. per square inch being used for the first pressing and a maximum of 640 lbs. per square inch for subsequent pressings.

In commercial oil making great difficulty has been experienced in separating the oil from the finely divided vegetable matter, which squeezes through the press cloth after the first pressing. In these experiments, this oily pulp was used to soften the mass of dry, recrushed pomace before it was pressed a second time. It was found that the solft pulp does not come through the cloths

with the oil the second time. This plan of working the pulp has been suggested for commercial use and has been employed with success by one manufacturer. In commercial practice oil of considerable value is left in the pomace after the last pressing. To decrease this loss the writer suggests that when the pomace is being pressed for the last time, it be made into smaller cheeses separated by gratings from one-half to two-thirds the area of those used for the first pressing. Notes and data are given on the pressing tests of the various varieties used, together with analyses of olives and a table showing the behavior of olive oils during hot and cold weather.

As a result of these investigations, the author finds that many varieties of olives, when grown under Arizona conditions, are well adapted to oil making, and that when properly made from them the oil may be of the very finest quality. Of the varieties tested, Mission, Correggiola, Pendulina, Razza, and Nevadillo were best suited for oil making. The recoverable oil content of the Arizona olive compares favorably with that of the California olive.

The hot weather test indicated that if cleanliness is diligently observed in the manufacture of olive oils, they are no more perishable than many other carefully prepared food products. The most satisfactory of the oils as to fluidity in cold weather is Mission. Mansanillo oil in particular solidifies easily into a semisolid state on cooling, even at a temperature between 40 and 50° F.

Contrary to the rather common opinion that the oil secured by the third and fourth pressings of the olive is suitable only for fuel or soap manufacture and that the so-called virgin oil, or first pressing oil, has poorer keeping qualities than that from the second pressing, the author found that under the conditions of the experiments oil from all the pressings (even up to five pressings) when mixed together did not appreciably lower the quality of the product. Even when thus mixed, practically all of the oils retained their high quality for one year at least under unusually trying temperature conditions. Most of the samples were ready for market 4 months after date of manufacture, instead of being aged for a year as is commonly done.

It is concluded that all the oil which it is possible to extract from ripe olives with a pressure of 640 lbs. per square inch may be mixed together with safety, provided all the pressings are made in one day and the oil is not allowed to stand with the black juice more than a few minutes, and very cleanly methods are used.

The author finds that the acridity so objectionable in oil is chiefly due to the admixture of green olives or olives which have matured at one end only. An inspection of a number of southwestern oil mills leads him to form the following conclusions as to the cause of the bad flavors sometimes secured: Careless picking whereby the berries are broken and a part of the oil set free, such free oil rapidly absorbing odors from the soil, musty sacks, etc., until pressed, allowing a long time to elapse between picking and pressing, thus allowing mold to develop on the broken berries, the use of filthy and rancid press cloths, the fibers of the cloth permitting the oxygen of the air to come into intimate contact with the absorbed oil with consequent rancidity, lack of dispatch in the pressing process and in separating the oil from the black press liquid, and overfiltration. Wherever oil is passed through filter paper in the open it is brought into more or less intimate contact with oxygen, with deleterious effects. Consequently the process of settling and racking should be relied upon as much as possible for the clarification of the oil.

Scheme for the classification of the races of olives grown in southern Italy, M. MARINUCCI (*Atti. R. Ist. Incoragg. Napoli, 6. ser., 60 (1908), pp. 165–180*).—This has been previously noted as a separate (E. S. R., 20, p. 1132).

Alcohol bath beneficial to oranges (*Cal. Fruit Grower, 41* (*1910*), *No. 1132, p. 5*).—According to this note, D. C. Lefferts of the Redlands Orange Growers' Association has been successful in separating frost bitten oranges from sound fruit by means of a denatured alcohol bath, the frost bitten fruit being sufficiently light to float on the top of the liquid. A machine has been devised for carrying on the separating process. Oranges subjected to this bath and examined later in the eastern markets appear to be particularly free from the spores of fungi which cause decay.

The export of citrus fruits, C. Fuller (*Natal Dept. Agr. Bul. 15, pp. 26*).—This consists of a report of the 1908 trial shipments of citrus fruits from Natal to Europe which were conducted under governmental control, together with suggestions relative to improvements in methods of harvesting and grading fruit. The shipments as a whole indicate the possibility of establishing an export trade with England when the fruit is handled and shipped with care.

The oranges coming from the higher altitudes showed much better keeping qualities than the coast grown fruit. This leads the author to conclude that unless a better keeping quality can be imparted to the oranges upon the littoral, the fruit for export purposes must be grown at least 2,000 ft. above sea level.

Spice, condiment, and perfume producing plants, J. A. Alexander (*Jour. Roy. Hort. Soc.* [*London*], *35* (*1910*), *No. 3, pp. 366–383, figs. 11*).—This paper gives a general account of a large number of plants yielding spices, condiments, and perfumes.

Vanilla culture in Cuba, E. Lamseus (*Estac. Expt. Agron. Cuba Circ. 37, pp. 36–40, fig. 1*).—A brief account of vanilla culture.

Coffea robusta, W. J. Gallagher (*Dept. Agr. Fed. Malay States Bul. 7, pp. 7*).—A brief treatise on the culture of this species of coffee in the Federated Malay States.

The production and commerce of Algerian dates (*Bul. Off. Gouvt. Gén. Algérie, 1910, No. 6, Sup., pp. 79–97*).—A statistical account of the date industry in different circles of Algeria.

The oil palm, S. Soskin (*Die Ölpalme ein Beitrag zu Ihrer Kultur. Berlin, 1909, pp. 55, pls. 9, figs. 17*).—This consists of a report on the culture of the oil palm based on observations made by the author in West Africa, together with information gleaned from the literature on the subject. The information is here brought together with a view of stimulating the oil palm industry in German East Africa. The oil palm (*Elæis guineensis*) is discussed relative to its botany, products and their uses, distribution, soil and climatic requirements, races and varieties, culture, harvesting, yields, marketing, and diseases and other enemies.

Pecans, P. F. Williams (*Bul. Dept. Agr.* [*Ala.*], *No. 34, pp. 56, pls. 4, figs. 4*).—This is a bulletin of general information on the subject of pecans, relative to their culture and care, varieties, insect pests and diseases, yields, etc.

Studies in ornamental trees and shrubs, H. M. Hall (*Univ. Cal. Pubs. Bot., 4* (*1910*), *No. 1, pp. 74, pls. 11, figs. 15*).—The object of this paper is to supply information relative to the culture, adaptation, and uses of a number of ornamental trees and shrubs, principally of Australian and South American origin, which either grow in California or are suitable to that climate. A critical botanical study of the species represented is also included, artificial keys to the species having been prepared for most of the groups, together with many illustrations. Among the groups considered are the Pittosporums, Hakeas, several genera of the Myrtaceæ, and a number of miscellaneous species.

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FORESTRY.

History of forestry, B. E. Fernow (*Toronto, 1909, pp. VIII+438*).—This consists of a brief history of forestry in Europe, the United States, and other countries. It has been prepared largely to bring together the information now scattered and mostly inaccessible to English or American readers and is based upon a series of lectures delivered before the students of forestry in Yale University.

Silviculture, A. Fron (*Sylviculture. Paris, 1909, pp. 496, figs. 94*).—The present edition of this encyclopedic work (E. S. R., 15, p. 480) has been largely rearranged and modified in many parts of the text.

Part 1, under the heading, the forest in general and its constituent elements, discusses the life of the tree in general, forest species, forest and woodlands, various forms of woodlands, the status of forestry, general utility of forests, and forest products and industries. Part 2 takes up practical silviculture under the subdivisions natural and artificial regeneration, cultural operations, forest management, and the wooded domain and its constituent elements. Part 3 comprises special studies of the coppice, coppice with standards, and high-forests systems.

Native trees of Kentucky, Sarah W. Maury (*[Louisville], 1910, pp. 140, pls. 3, figs. 44*).—A popular handbook on the native trees of Kentucky, describing the general characteristics of each species, the wood and its uses, and the tree, bark, leaves, and fruit. Both common and botanical names are given, together with illustrations of fruiting branches in many cases.

A new cypress for Arizona, G. B. Sudworth (*Amer. Forestry, 16 (1910), No. 2, pp. 88–90*).—The author describes a new species of cypress recently found on the north slope of the Verde River Canyon and for which he proposes the name *Cupressus glabra*. The wood of this cypress is said to be exceedingly durable in an unprotected state as compared with the wood of *C. arizonica*, which is not of particularly lasting quality.

Studies in the vegetation of the Philippines. I, The composition and volume of the dipterocarp forests of the Philippines, H. N. Whitford (*Philippine Jour. Sci., C. Bot., 4 (1909), No. 4, pp. 699–726, pls. 7*).—A study of the composition and volume of the dipterocarp forests in different sections of the Philippines, with tabular data on some of the more dominant trees, showing the number of trees or cubic meters of wood per hectare and the percentage each species forms of the stand.

The virgin forest area of the Philippines consists of approximately 40,000 square miles, or about one-third the total area, and members of the dipterocarp family predominate in 75 per cent of these forests. From the forester's and lumberman's standpoint, they are divided into three tree groups, the hard durable yacals, the apitongs, and the lauans, the second group corresponding to the hard pines in general mechanical properties and the last to the soft pines. In studying the volume of these forests, bulk and annual increment were both taken into consideration. The author concludes that if measured in bulk alone some temperate regions show greater success in forest growth than the Philippines. When bulk and annual increment are combined, however, Philippine forests compare favorably with forest growth in temperate regions.

Preliminary study of the woods of the Ivory Coast, A. Chevalier (*Vég. Utiles Afrique Trop. Franç., 1910, No. 5, pp. 314, map 1*).—This consists of a preliminary report of a survey of the forest flora of the Ivory Coast.

Part 1, which is introductory in its nature, deals with the history of various missions to the Ivory Coast and lines of study pursued. Part 2 discusses the actual exploitation of the forests. Part 3, which is the most important sec-

tion of the work, describes the various species noted, including their scientific and vernacular names, important characteristics, habitat, and uses. In Part 4, the author discusses and draws conclusions relative to the future of forestry in the Ivory Coast. A list is included of the woods collected during the surveys of 1906–7, together with a map tracing the courses of the survey and showing the principal zones of vegetation.

Burma padauk (Pterocarpus macrocarpus), R. S. TROUP ([*Indian Forest Dept.*] *Pamphlet 14, Forest Econ. Ser. 7, pp. 41, pl. 1, map 1*).—An account is given of this species of timber tree relative to its nomenclature, vernacular names, distribution, locality, climate, geology and soil, forest type, density of stock, reproduction, distinguishing characteristics, description and properties of the wood, exploitation, demand, prices, yields, and uses. The wood is extensively used in ordnance work and for furniture. It is also being tested for paving blocks. It is essentially a high-class hard wood.

Experiments upon the conservation of forest seeds, E. ZEDERBAUER (*Centbl. Gesam. Forstw., 36 (1910), No. 3, pp. 116–121*).—In the work here reported two factors, temperature and moisture, were investigated relative to their effect upon the germination power of stored seed. Seeds from a number of coniferous and deciduous species were stored in rooms and soils having varying natural temperature and moisture conditions, and the results secured are presented in tabular form. In general, low temperatures and high humidity or high soil moisture were found to act favorably upon stored seed in checking both respiration and transpiration.

On the storage of pine and spruce seeds, HAACK (*Min. Bl. K. Preuss. Verwalt. Landw., Domänen u. Forsten, 6 (1910), No. 2, pp. 84–87*).—This is a ministerial order to the various forestry stations in Germany relative to the conservation of pine and spruce seed, the instruction given being based upon the experimental results secured by Haack (E. S. R., 21, p. 441).

Forest nursery and reforestation work in Massachusetts, R. S. LANGDELL (*Boston: State Forester, 1910, pp. 36, pls. 11*).—The purpose of this bulletin is to present definite information relative to the establishment and management of forest nurseries, as well as on the reforestation of waste and denuded lands and their subsequent management as sources of revenue. Descriptions are also included of the reforestation work done by the State and of the silvicultural characteristics of trees most commonly found growing in Massachusetts, including the uses to which their timber is put and a few of their most important enemies.

Tree culture, O. M. MORRIS (*Oklahoma Sta. Bul. 86, pp. 3–35, figs. 15*).—This bulletin contains popular directions for the culture and care of shade trees and trees for post and pole production, including notes on the species adapted for each purpose.

Some notes on tree planting in the shire highlands of Nyasaland, J. M. PURVES (*Nyasaland Agr. and Forestry Dept. Bul. 1, 1910, pp. 8*).—This consists of brief notes for prospective tree planters relative to the selection and culture of the most suitable kinds of trees for timber and fuel production, as well as for shelter and ornamental purposes. The trees discussed are grouped into three general classes, durable hard woods, durable soft woods, and trees for ornament and shelter-belts.

Report on forest statistics of Alsace-Lorraine (*Beitr. Forststatis. Elsass-Lothringen, 1910, No. 27, pp. 124*).—This is the customary statistical report relative to the administration of the state, public, and community forests in Alsace-Lorraine for the year 1908. Detailed and summarized data are given relative to forest areas, silvicultural operations, products, revenues, expenditures, etc., including a comparative summary for each year since 1870.

Indian state forestry, S. EARDLEY-WILMOT (*Jour. Roy. Soc. Arts, 58 (1910), No. 2993, pp. 493-508*).—This paper, together with the accompanying discussion, deals with forest conditions in India and the progress made in forest management.

Reports on certain continental forests, F. L. COWLEY-BROWN (*Madras: Govt., 1908, pp. 83, figs. 20*).—This report embraces the salient features of an inspection tour of a number of continental forests.

In part 1 consideration is given to the forests of the Gironde and Landes coasts, with special reference to the fixation of the dunes and moving sands, forest management, and resin exploitation. Succeeding parts of the report take up the forest of Heppenheim, forests in the Pau conservation, projects of defense in the Pyrenees and in the Alps, the forest school at Vallombrosa, forests in the Nice conservation, the instruction forest and forest school at Nancy, together with several supplementary notes on French forests. Suggestions are also included relative to the application of the observations reported to conditions in India.

Forest divisions in Burma and the United Provinces, F. A. LEETE (*Indian Forester, 36 (1910), No. 1-2, pp. 47-69*).—A descriptive account of these divisions is given, including information relative to their management.

The structure, properties, and uses of wood, H. WILDA (*Das Holz Aufbau, Eigenschaften und Verwendung. Leipsic, 1909, pp. 125, figs. 33*).—A concise treatise on this subject, discussing the growth and structure of woods, their physical properties, enemies and protection, the uses of wood in various trades and industries, including information relative to the chemical and mechanical treatment and the adaptation of various kinds of wood for industrial purposes.

The preservative treatment of farm timbers, C. P. WILLIS (*U. S. Dept. Agr., Farmers' Bul. 387, pp. 19, figs. 5*).—The information presented is based upon preservative studies conducted by the Forest Service in cooperation with the Commissioner of Agriculture and Industries of Alabama, and the Alabama, Iowa, Louisiana, Maryland, Minnesota, and South Carolina stations. The methods of prolonging the life of fence posts were found to be in the following order of efficiency, beginning with the cheapest and less effective: Peeling and seasoning, charring, painting, dipping, the cold bath treatment, and impregnation with creosote.

In the experimental work conducted, impregnation with creosote was found to be decidedly the best preservative treatment. The use of creosote is discussed, relative to method of treatment, forms of treating tanks, preparation of posts for treatment, the application of preservative, and the cost and value of treatment. It is pointed out that all ordinary farm lumber may be treated in a very similar manner to posts. Special consideration is given to the treatment of shingles, creosote and other derivatives of coal tar being deemed the best antiseptics. In order to overcome the odors which these substances possess, it is advised that the shingles be seasoned for a few weeks between treating and laying.

Preservatives for wood paving blocks, C. N. FORREST (*Engin. Rec., 61 (1910), No. 16, pp. 531, 532*).—The author presents data to show that tar is a better water-proofing agent than creosote and will remain in the blocks for a longer period of time. Tar is also being adopted in lieu of creosote oil for wood paving blocks because it is a cheaper preservative.

Rubber, A. FAYOL (*Le Caoutchouc. Paris, 1909, pp. III+138*).—A technical treatise on latex and the preparation and manufacture of rubber, including introductory remarks relative to the history of the rubber industry.

[Rubber analyses] (*Bul. Imp. Inst. [So. Kensington], 7 (1909), No. 3, pp. 255-263*).—Analyses are reported of samples of *Funtumia elastica, Clitandra*

elastica, and "Marodi" vine rubber from southern Nigeria, rubber of *Ficus vogelii* from the Gambia, and of Vahea rubber, a species of Landolphia from Seychelles.

Treatment and transformation of Eucalyptus globulus forests, H. MÜLLER (*Rev. Secc. Agron. Univ. Montevideo, 1908, No. 4, pp. 95–106*).—In this article the author outlines methods for the silvical treatment and exploitation of *E. globulus* forests in the department of Montevideo, with a view of obtaining the greatest percentage of timber possible and of substituting other more useful species without lessening the production of the forests in the meanwhile.

On the elastic substance occurring on the shoots and young leaves of Eucalyptus corymbosa and some species of Angophora, H. G. SMITH (*Jour. and Proc. Roy. Soc. N. S. Wales, 42 (1908), pp. 133–144, fig. 1*).—An investigation of the properties and composition of the elastic substance occurring on the shoots and young leaves of *Eucalyptus corymbosa*, *Angophora lanceolata*, and *A. intermedia* leads to the conclusion that it is a good form of caoutchouc. The author notes that this is probably the first time that caoutchouc has been shown to occur in any member belonging to the Myrtaceæ. The small percentage obtained, however, makes it at present of scientific value only.

The rubber industry of Mexico, P. OLSSON-SEFFER (*Trop. Life, 6 (1910), No. 3, pp. 50–52*).—The author discusses the present status of the rubber industry in Mexico and gives as a conservative estimate of the possible production of rubber in that country between the years 1912 and 1915 a total of 18,000 tons per annum from all sources, including wild and planted Castilla, Plumeria, Guayule, Pedilanthus, and Jatrophas, as well as some minor rubber producers.

DISEASES OF PLANTS.

Plant diseases for the year 1909 worthy of special notice, K. STÖRMER (*Landw. Wchnschr. Sachsen, 12 (1910), Nos. 2, pp. 10–12; 3, pp. 19–21; 4, pp. 27–29*).—Special mention is made of the grain fly ravages, oat root disease, grain mites, loose smut of grains, and leaf roll disease of the potato. Four methods of treating the grain for prevention of loose smut were tried, namely, copper sulphate, formalin, warm water, and hot air, but only the warm-water method gave favorable results.

In the copper sulphate treatment, three solutions of different strengths were used, 1, 0.5, and 0.1 per cent, respectively. The grain in each case remained for 16 hours in the solution, which in one set of experiments was at a temperature of 15° C. and in another at 25°. The results in all cases were unsatisfactory, for when the smut was materially decreased a marked injury to the germinating power of the grain followed.

In the formalin treatment, the seeds were immersed in a 0.1 per cent solution of formalin for 10 minutes with practically no effect on the smut.

In the warm-water method, seed that had been soaked for 6 hours in water at a temperature of from 20 to 25°, and seed that had not been soaked, was immersed for 10 minutes in hot water, at a temperature for each experiment of 50, 53, and 56°, respectively. Only the soaked seed showed favorable results in controlling the smut. In the case of barley, the smut was entirely destroyed, but the germinating power was injured, the injury increasing with the degree of heat used. With the summer wheat the effect on the smut was not so marked, but the treatment was still of decided value.

In the hot-air treatment, the following experiments were made: (1) Dry grain heated for 45 minutes in hot air at a temperature of from 80 to 100°, with no appreciable effect on the smut; (2) damp grain heated in air, first at a temperature of from 50 to 60° for 60 minutes, and then raised to from 80 to 100°

for 45 minutes, with an inappreciable result on the smut; and (3) grain soaked for 6 hours and then subjected to hot air at a temperature of from 50 to 60° for 60 minutes, and then raised to from 80 to 100° for 45 minutes, this treatment materially decreased the smut on the barley but had no effect on the smutting of the wheat.

The objection to the warm-water treatment is that it appreciably lowers the germinating power of the grain. The most favorable results obtained were by soaking the grain for 6 hours in water at a temperature of from 20 to 25°, and then in hot water at from 52 to 53° for 10 minutes. If the grain is immediately planted, the injury to its germinating power is materially lessened. It is suggested that by the use of a large drying apparatus, the hot or warm water treatment can probably be used without injury to the viability of the grain.

The prevalence of the leaf roll disease of the potato is discussed, and the author claims that this disease results from the deteriorated (run out) condition of the seed tubers, due to a continued use, year after year, of the same strains in the same localities, and is accelerated by warm winters and exposure to light, thus causing further exhaustion of the seed potatoes by premature sprouting in storage. Plants from such tubers will always develop the disease. It is also claimed that as the disease is an accompanying phenomenon of exhaustion, it is, therefore, not infectious but is transmitted on account of its relation to the internal condition of the tubers. The results of a series of experiments with seed from other regions are given, which show that seed tubers from countries with a high altitude and cold winters are less susceptible to the disease, and therefore produce a larger yield than home-raised seed. This was especially noticeable in the potatoes from seed imported from Silesia. Farmers in regions subject to this disease are advised to import seed potatoes from colder countries where the disease does not exist.

Diseases and injuries to cultivated plants in the provinces of Posen and West Prussia for 1908, R. SCHANDER (*Mitt. Kaiser Wilhelms Inst. Landw. Bromberg, 2 (1910), No. 1, pp. 3–136, pl. 1, figs. 4, maps 6*).—This is a comprehensive statement of fungus, insect, and weed pests of cereals, root crops, forage plants, vegetables, orchard fruits, grapes, berries, forest trees, etc., and remedies therefor, with tables, charts, etc., showing the distribution of the diseases and their relative amount of injury.

Some diseases of cultivated plants, V. DUCOMET (*Ann. Ecole Nat. Agr. Rennes, 2 (1908), pp. 1–54; abs. in Bot. Centbl., 111 (1909), No. 21, pp. 545, 546*).—The author discusses 5 parasites, of which the following are described as new: *Fusarium loliaceum* on rye grass (*Lolium italicum*); *Sphærella pinifolia*, which forms smoky patches of mycelium on the needles of maritime pine (*Pinus maritima*); and *Vermicularia varians*, a sclerotium disease of potato tubers, which is also found on the tomato and *Physalis peruviana*.

A vermicular disease of the cork oak (*Quercus suber*) is attributed to a nematode (*Heterodera radicicola*) as a primary cause, followed by invasion of fungi into the galls thus formed. The Oïdium of the oak so prevalent in 1908 and 1909 in France is discussed and the conclusion is reached that it is not *Microsphæra alni* and probably not *Oïdium quercinum*.

The parasites of plants of Torino and vicinity, P. VOGLINO (*Ann. R. Accad. Agr. Torino, 51 (1909), pp. 1–38; abs. in Centbl. Bakt.* [etc.], *2. Abt., 26 (1910), No. 4–5, pp. 102, 103*).—This is a list of the parasitic fungi common to garden and field crops, with records of experiments as to the identity of several disputed species. The author after describing as new 6 varieties and species of fungi closes with an account of insect injuries to various plants, and a list of 64 hosts for peach scale (*Diaspis pentagona*).

Three fungus diseases worthy of consideration, G. Köck (*Verhandl. K. K. Zool. Bot. Gesell. Wien, 59 (1909), Nos. 1–2, p. (48); 3–4, pp. (49–57); abs. in Centbl. Bakt.* [*etc.*], *2. Abt., 25 (1909), No. 19–25, pp. 519, 520*).—The 3 diseases noted are melon mildew (*Pseudoperonospora cubensis*), gooseberry mildew (*Sphærotheca mors-uvæ*), and the leaf roll disease of the potato (*Fusarium* sp.).

The author discusses the life history and dissemination of the melon mildew and its systematic position in the Peronosporeæ. It was found that in Austria the pumpkin had a greater resistance to the disease than the muskmelon and both of these greater than the cucumber. Experiments with 76 varieties of cucumbers showed that the susceptibility of each variety to the mildew was very different, the climbing cucumber or gherkin having the greatest immunity as previously noted (E. S. R., 20, p. 247). For the control of the disease a 1 per cent Bordeaux mixture proved effective. Soil and seed disinfection are also recommended. The application of the Bordeaux mixture reduced the yield of fruit, presumably because of a checking of the transpiration and assimilation in the leaves and a consequent decrease in the quantity of fruit set.

The gooseberry mildew is claimed to have been introduced from 3 different centers of infection, Ireland, Denmark, and Russia, which accounts for the prevalence throughout Austria of this fungus. It is especially destructive to certain varieties of Austrian gooseberries. Spraying with a 2 per cent solution of Bordeaux mixture is recommended.

The author believes that the leaf roll disease of the potato is due to a fungus parasite, aided by other factors, such as weather, character of soil, etc.

The control of melon and cucumber blight and bean anthracnose, C. D. Jarvis (*Connecticut Storrs Sta. Rpt. 1908–9, pp. XXXI, XXXII*).—Spraying experiments have been in progress at the Connecticut Storrs Station for 6 years for the control of melon and cucumber blight (*Plasmopara cubensis*). The conclusions derived from the experiments are that Bordeaux mixture will not completely control the disease, but will check its development sufficiently to permit the maturing of the crop. The fungicide has an injurious effect upon the foliage and the flowers, and in seasons of little or no blight may decrease the yield of fruit. The results of the 6 years' experiments, however, show that even with the injurious effect it has upon the plant, it pays to spray melons and cucumbers with Bordeaux mixture every year as a safeguard against disease. Half-strength Bordeaux mixture, 2 : 2 : 50, was found to give as good results as the full-strength mixture, and its injurious effect was less pronounced.

A brief account is given of spraying experiments for the control of bean anthracnose. It was found that this disease can be controlled by repeated and thorough sprayings, but the foliage must be completely covered with the mixture from the first week in July to the maturing of the fruit.

Diseases of cultivated plants in the Tropics, C. Brick (*Jahresber. Ver. Angew. Bot., 6 (1908), pp. 223–258, figs. 6; abs. in Centbl. Bakt.* [*etc.*], *2. Abt., 25 (1909), No. 19–25, pp. 522, 523*).—The fungi that attack cacao, coffee, india rubber, and other plants, are briefly described, and remedies suggested for each disease.

Bacteria causing plant diseases, G. Köck (*Monatsh. Landw., 2 (1909), p. 247; abs. in Centbl. Bakt.* [*etc.*], *2. Abt., 25 (1909), No. 19–25, pp. 521, 522*).—The author has compiled a list of the diseases of plants known to be caused by bacteria and also those that are supposed to be thus produced. It is stated that no direct application of fungicide will, as a rule, control bacterial diseases, but that each species demands special methods for its prevention or eradication.

Exotic fungi, G. Massee (*Roy. Bot. Gard. Kew, Bul. Misc. Inform., 1910, No. 1, pp. 1–6, pl. 1*).—The author describes as new 16 species of fungi, the majority from the West Indies. Of this number the following may become of

economic importance: *Marasmius scandens*, on the cultivated cacao plants of Africa; *Diplodia rapax*, parasitic on the living branches and roots of Para rubber trees of tropical Africa; *Glœosporium citri*, on orange leaves from Trinidad; and *Macrosporium lanceolatum*, on leaves of *Agave rigida* from Mozambique.

Two of the fungi were found infesting the bodies of injurious insects and may prove of economic value, namely, *Septocylindrium suspectum* n. sp., on the bodies of dead frog-hoppers (Cercopidæ) from Trinidad, and *Scleroderris gigaspora* n. sp., occurring in clusters on scale insects (*Mytilaspis citricola*) also from Trinidad.

Organoid galls, E. Küster (*Biol. Centbl., 30 (1910), No. 3, pp. 116–128*).—According to the author, galls can be divided into histoid and organoid. The organoid galls are those which are characterized by a transformation of old or the formation of new organs, while the histoid are composed of simple abnormal tissue. The organoid galls in all their morphological characters belong with those abnormal structures which have been produced by general or local nutrition changes, and, therefore, would be classed as truly etiological.

Contributions on galls produced by Uredineæ, Ruth Stämpfli (*Hedwigia, 49 (1910), No. 4–5, pp. 230–267, figs. 27*).—This is an investigation of the morphological changes produced in the tissues of host plants by the presence of invading fungi, and is discussed under 3 heads: Typical galls, (2) deformation of the flowers, and (3) galls on stems and leaves.

Specific cases of gall production on various host plants by different Uredineæ were studied in detail, especially with reference to any change produced in the various elements of the tissues of the host, such as production of sclerenchyma, wood fibers, parenchyma, etc. The author found that the galls and other deformations of the tissues of the host are produced mainly by an extra growth of parenchyma tissue in the invaded region, and that the sclerenchyma strands, wood fibers of the vessels, etc., were but little changed.

The sexuality of rusts, L. Kurssanow (*Ztschr. Bot., 2 (1910), No. 2, pp. 81–93, pl. 1*).—The author briefly reviews the recent literature on the sexuality of rusts and notes the different interpretations of various investigators on disputed points, closing with a discussion of the phenomena observed in his studies of the young æcidial stages of *Puccinia peckiana*, better known as *Cæoma nitens*, in which he claims to have found a true conjugation of sexual cells or gametes.

Infection experiments with crown rust, F. Mühlethaler (*Centbl. Bakt. [etc.], 2. Abt., 26 (1910), No. 1–3, p. 58*).—Sowings of teleutospores of crown rust from *Calamagrostis varia* on *Rhamnus alpina* and *R. purshiana* produced abundant æcida; also sowings of æcidiospores from *R. alpina* on *C. varia* and *C. tenella* produced uredosori. Æcidiospores from *R. cathartica* produced uredosori on *Bromus erectus condensatus*, *Festuca alpina*, *F. arundinacea*, *F. gigantea*, and *F. varia*. The uredospores from *B. erectus condensatus* were able to infect *B. erectus condensatus*, *B. erectus*, *B. inermis*, *B. sterilis*, and *B. tectorum*.

Seed disinfection and crop production; methods and types of machinery needed, H. L. Bolley (*North Dakota Sta. Bul. 87, pp. 131–166, pls. 7, figs. 15*).—The author describes in popular language some of the principal diseases of wheat, oats, and other cereals which are introduced through seed, and gives simple directions for the methods of prevention or control of seed-borne diseases. Among the diseases described are the stinking smut of wheat, oat smut, loose smut of wheat, loose smut of barley, flax wilt, and flax canker. For the control of these diseases various methods of treatment with fungicides have been recommended, and formulas and methods of treatment are described.

As a result of the author's studies, he is convinced that for the farmers of the Northwest the formaldehyde treatment, as used for the prevention of stinking smut of wheat and loose smut of oats, and the modified hot-water treatment for the prevention of loose smut of barley and wheat will give the most satisfactory results. For the flax diseases the separation of all light seed and the treatment of the heavy seed with formaldehyde is recommended.

For the treatment of seed various methods have been devised, and a number of successful forms of machinery for treating grain are described.

Maize smut, T. H. JOHNSTON (*Agr. Gaz. N. S. Wales, 21 (1910), No. 1, pp. 43, 44, figs. 2*).—The author gives the following as the smuts of New South Wales: Maize smut (*Ustilago maydis*), two barley smuts (*U. hordei* and *U. nuda*), the loose smut of oats (*U. avenæ*) and of wheat (*U. tritici*), bunt or stinking smut of wheat (*Tilletia tritici* and *T. lævis*), flag smut of wheat (*Urocystis occulta*), and another smut (*Ustilago* sp.) on couch grass. A popular description of the life history of the corn smut and remedies for its control are given.

Smut in wheat (*Agr. Gaz. N. S. Wales, 21 (1910), No. 1, pp. 58, 59*).—Attention is called to the fact that F. Maddox 15 years ago conducted a series of experiments (E. S. R., 9, p. 1057) on smut infection of wheat by loose smut (*Ustilago carbo*), which showed that flower infection was its only means of propagation, a conclusion that has since been confirmed by other investigators (E. S. R., 16, p. 676; 19, p. 750; 21, p. 445).

The flower-infection of wheat smut, W. LANG (*Centbl. Bakt.* [etc.], *2. Abt., 25 (1909), No. 1-4, pp. 86-101, pl. 1, figs. 2*).—A general history of the study by various investigators of the propagation of the grain smuts is given, followed by observations on the characters of the spores, their germination, infection, and subsequent path of the germ tube down the stigma to the embryo, the entrance of the mycelium into the embryo and its final wintering over in the grains of wheat. It is claimed that the spread of the smut is mainly by bloom infection and that the weather conditions at this period have much to do with the success of the infections. Breeding varieties of wheat the seed coats of which are able to prevent the entrance of the mycelia into the embryo during the blooming season is recommended.

The propagation of Sclerospora macrospora by means of wheat kernels, V. PEGLION (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 17 (1908), II, No. 9, pp. 509-511; abs. in Centbl. Bakt.* [etc.], *2. Abt., 26 (1910), No. 4-5, p. 108*).—It is stated that this fungus infects the young ovaries of the wheat, which at maturity show no external signs of disease, but on examination reveal an abundance of mycelia within the pericarp of the seed. When the wheat is planted and germination occurs, this enclosed mycelium also grows and easily penetrates into the tender tissues of the wheat seedlings. By this means direct propagation and dissemination of this mildew are accomplished through apparently sound seed.

Smut infection of wheat by means of infected manure, soil, and seed, B. STEGLICH (*Fühling's Landw. Ztg., 58 (1909), No. 20, pp. 738-742; Landw. Vers. Stat., 72 (1910), No. 5-6, pp. 344-350*).—The results are given of a series of experiments to test the smutting of wheat from manure, soil, seed, and bran, each of which had been infected with the spores of a smut (*Tilletia lævis*).

It was found that manure mixed with smut spores was able to infect the seedling wheat slightly, but the percentage of infection was very small when the manure was left in heaps from 15 to 30 days and then spread on the ground immediately before the sowing of the wheat. The infection from the soil was much greater than from manure, and when smutty seed was used the infection

was even greater than with either soil or manure. The infection was less in each case with the late planted wheat. Smutty bran was able to infect the seedling wheat when sown in the drills with the seed.

Some observations on bean rust, G. GASSNER (*Rev. Secc. Agron. Univ. Montevideo, 1908, No. 4, pp. 125–129, fig. 1*).—The attacks of this fungus (*Uromyces appendiculatus*) were so severe in 1908 at the experiment station near Montevideo that much of the crop was lost, mainly on account of the badly rusted condition of the pods. Experiments undertaken with 13 varieties to discover if possible resistant varieties showed that several were only slightly attacked and these may, therefore, prove of value in combating the rust.

Diseases of celery, H. KLEBAHN (*Ztschr. Pflanzenkrank., 20 (1910), No. 1, pp. 1–40, pls. 2, figs. 14*).—The author briefly discusses celery culture and gives extended descriptions of some infection experiments with two of its common diseases, leaf spot and scab disease of the roots and crown. The conclusion is reached that the leaf spot is caused by *Septoria apii* and the scab by *Phoma apiicola*.

The remedies recommended for the leaf spot are Bordeaux mixture, and for the scab treatment of the soil with disinfectants. As the pycnidia of both diseases are found on the seed, an application of Bordeaux might be of value to both the seeds and the seedlings.

Potato diseases in Ireland, G. H. PETHYBRIDGE (*Dept. Agr. and Tech. Instr. Ireland Jour., 10 (1910), No. 2, pp. 241–256, pls. 7; abs. in Farmers' Gaz., 69 (1910), No. 7, p. 130, figs. 2*).—The results are given of numerous experiments conducted at a temporary experiment station at Clifden in Western Ireland in 1909, with special reference to a further study of the various diseases of the potato and to determine, as far as possible, the best means for controlling them. Late or black blight (*Phytophthora infestans*), yellowing or yellow blight, stalk or Sclerotium disease (*Sclerotinia sclerotiorum*), black stalk-rot or black leg, and Spongospora scab (*Spongospora subterranea*) were studied and methods of control suggested for each. Mention is also made of leaf curl (*Verticillium albo-atrum*), black speck scab (*Corticium vagum solani*), and violet root rot (*Rhizoctonia violacea*).

Spongospora scab of potatoes, G. H. PETHYBRIDGE (*Irish Nat., 18 (1909), No. 5, pp. 118, 119; abs. in Bot. Centbl., 113 (1910), No. 1, p. 19*).—After tracing the history as revealed in the literature of this potato fungus, the conclusion is reached that the correct name is *Spongospora subterranea*.

Potato-spraying at the Grafton experiment farm, A. H. HAYWOOD (*Agr. Gaz. N. S. Wales, 21 (1910), No. 1, pp. 63, 64*).—These experiments were undertaken to ascertain the cost per acre of thoroughly spraying the potato crop for late blight (*Phytophthora infestans*). The outfit including all accessories cost about $65, and consisted of a good spray pump with 4 single spray nozzles, carried on a one-horse wagon, and required the services of 2 men to run it. The spray used was 6 : 4 : 40 Bordeaux mixture applied at the rate of 50 gal. per acre. The capacity of the outfit was 6 acres per day and the cost of 1 application was estimated at 85 cts. per acre.

Old and new enemies and diseases of berries, G. LÜSTNER (*Amtsbl. Landw. Kammer, Wiesbaden, 91 (1909), Nos. 15, pp. 102, 103, fig. 1; 16, pp. 107, 108, fig. 1*).—This deals with the American gooseberry mildew (*Sphærotheca mors-uvæ*) and leaf spot (*Glœosporium ribis*) on currants and gooseberry plants.

A description of the leaf spot disease is given, accompanied by drawings showing its gross and microscopic characteristics. Bordeaux mixture is recommended as a remedy.

In the second paper, *S. mors-uvæ* is discussed and figured. This disease attacks all parts of the plants, leaves, stems, and fruits. Several varieties of

currants are mentioned as resistant to the disease. For its prevention potassium sulphid is recommended, 1 kg. of the salt being used to 100 liters of water, or if that proves too strong, 400 gm. to 100 liters of water may be used. Spraying should be done every 8 to 10 days, beginning with the unfolding of the leaves. Five to eight applications during the season are recommended.

The use of different varieties of gooseberry in combating the American gooseberry mildew, J. Eriksson (*Deut. Obstbau Ztg., 1909, No. 22-23, pp. 340-346, figs. 2; abs. in Centbl. Bakt.* [etc.], *2. Abt., 26 (1910), No. 4-5, p. 110*).—The author states that there are two ways of combating the ravages of the American gooseberry mildew, one by vigorous pruning away of diseased canes in the late fall and winter, which is usually a very unsatisfactory method, and the other by judicious selection of the more resistant varieties of currants and gooseberries to breed a variety that will be immune to the disease.

The pathogenic spotting of the annual canes of the grape, E. Molz (*Centbl. Bakt.* [etc.], *2. Abt., 20 (1908), No. 10, pp. 261-272, pls. 2, figs. 13; abs. in Bot. Centbl., 111 (1909), No. 25, pp. 647, 648*).—The spots found on the young wood of grapevines are figured and described under the following heads: Cortical warts (young lenticels), so-called pearl glands, Oïdium spots (*Uncinula necator*), anthracnose (*Sphaceloma ampelinum*), spots due to Bordeaux spray, and those caused by hail or other mechanical injuries.

A disease of the pedicels of the grape, P. Pacottet (*Rev. Vit., 32 (1909), No. 814, pp. 98, 99*).—The author claims that this disease is often very destructive to the crop, as it attacks the pedicels at the time the berries are ripening. It is usually preceded by a period of bad weather or extreme changes in temperature, especially after a sudden cold spell. The disease first manifests itself on the pedicels as a brown ring or spot more or less extended. The pedicels attacked dry up without the berries apparently suffering, but after a little they fade without ripening and either dry up or rot according to the degree of humidity. In the last stages of the disease, a fungus (*Botrytis cinerea*) infects the necrotic tissues.

Authorities are divided as to its causes. Some claim it is a fungus (*B. cinerea*), others a bacterial affection, and still others maintain that it is physiological, due to a disturbance of the nutrition by sudden chilling succeeding a period of great heat and active movements of the sap.

The remedies suggested are the development of an excellent root system by uniform cultivation, the avoidance of vigorous pruning, and the use of light fires to protect the stems from sudden changes of temperature.

Fire blight of pears, apples, quinces, etc., H. H. Whetzel and V. B. Stewart (*New York Cornell Sta. Bul. 272, pp. 31-51, figs. 19*).—The purpose of this bulletin is to present the history, symptoms, and causes of this disease, together with the results and conclusions as to its dissemination and control which may be of immediate and direct value to the orchardist.

Thorough and rigorous pruning of all cankers and diseased spurs, together with the proper disinfection of all wounds, is the method recommended for controlling this blight.

Some apple diseases, C. Brooks (*New Hampshire Sta. Bul. 144, pp. 109-138, figs. 29*).—Popular descriptions, together with suggestions for treatment, are given of apple scab (*Venturia pomi*), fruit spot (*Cylindrosporium pomi*), fruit pit, sooty blotch and fly speck (*Leptothyrium pomi*), apple rust (*Gymnosporangium globosum*), black rot or canker (*Sphaeropsis malorum*), bitter rot (*Glomerella rufomaculans*), fire blight (*Bacillus amylovorus*), crown gall (*Pseudomonas tumefaciens*), European apple canker (*Nectria ditissima*), blister canker (*Nummularia discreta*), and winter injury.

The bulletin closes with a discussion of spray injury and directions for the preparation and use of Bordeaux mixture and lime-sulphur sprays.

Peach yellows and little peach, M. A. BLAKE (*New Jersey Stas. Bul. 226, pp. 3–26, pls. 16*).—This is a discussion of the history, prevalence, cause, and characteristics of and remedies for these two diseases, with an appeal to the peach growers of the State to practice clean, intensive orchard methods and to eradicate all affected trees. These diseases are prevalent to some degree throughout the State and neighboring States and are an increasing menace to the future welfare of the peach industry, which is now gaining strength after the severe check due to San José scale.

In the early stages peach yellows is indicated by the leaves of one branch of an apparently healthy tree turning yellowish or reddish-green, rolling up from the edges, and falling early while the remainder of the tree retains its foliage. The fruit buds are longer and further advanced upon the affected limb, while the bark has a riper appearance with noticeably larger lenticels. Instead of these symptoms, the leaves in the center of the tree may turn a light to yellowish-green, roll slightly from the edges toward the midrib and droop downward toward the trunk to some degree This yellowing and rolling may extend well out toward the tips of the branches, and the affected leaves are often shorter and smaller than under normal conditions. Instances have also been observed of young trees the entire foliage of which became slightly yellow during the late fall, followed in the spring by the fruit buds pushing out in advance of the normal trees, the new leaves remaining a yellowish green until finally there appear unmistakable symptoms of yellows. These earlier stages are more difficult to determine in neglected orchards as the foliage of all the trees may be off color. Upon bearing trees yellows may first appear in the premature ripening of fruit upon one branch or over the whole tree, while otherwise the tree may appear healthy.

Little peach has much the same general characteristics so far as the effects on the leaves are concerned, but causes the fruit to ripen later than normal. It also appears to spread more rapidly through an orchard than yellows, and the practice of permitting affected trees to remain increases the danger to young orchards without benefit to the grower in any way. The exact cause of these diseases is still unknown.

The following suggestions for the prevention and control of the yellows and little peach are given: Select a well drained site for the orchard, purchase well grown nursery trees of a medium to large grade, and avoid weak trees and those grown near an infested orchard. Practice good orchard management in the form of proper cultivation and sufficient fertilizers, but do not fertilize to excess, especially with nitrogenous manures. Closely observe the growth of each tree and if symptoms of either disease appear, dig up and burn at once. Trees removed in orchards from 1 to 5 years old may be replaced by nursery trees, but in older orchards this replanting is of doubtful value, as the young trees will be retarded in their growth by the surrounding trees.

The peach leaf curl, G. GASSNER (*Rev. Asoc. Rural Uruguay, 37 (1908), No. 10, pp. 546–551*).—A popular description of this common disease (*Exoascus deformans*), with methods of control by the use of Bordeaux mixture, is given.

A disease of bananas (*Jour. Jamaica Agr. Soc., 13 (1909), No. 12, pp. 433, 434*).—It is stated that two serious troubles beset the banana growers of Costa Rica, one due to multitudes of gophers burrowing under the ground and eating away the roots and bulbs until the whole stool falls, and the other apparently a bacterial disease, capable of infecting healthy plants which have replaced diseased ones. A plant which is apparently a cross between the banana and the plantain seems to be immune to this disease.

Black canker of the chestnut, G. Briosi and R. Farneti (*Abs. in Bot. Centbl., 110 (1909), No. 19, pp. 489, 490*).—According to the authors, the black canker or root disease of the chestnut is contagious, progressing downward on the trunk from the original source of infection into the roots until the entire root system is invaded. At the base or on the lower parts of the trunks of young trees, a cankerous outgrowth is found, caused by a fungus parasite for which the name *Coryneum perniciosum* n. sp. is suggested.

For young timber vigorous pruning and burning of all diseased wood is recommended, following this by painting the wounds with mastic, tar, or other disinfectant. On old trees all infected bark and wood should be cut out and the wounds washed with a concentrated solution of sulphate of iron to which sulphuric acid has been added.

The recent disease of the oak, A. Trotter (*Bul. Soc. Bot. Ital., 1908, No. 7–9, pp. 115–117; abs. in Bot. Centbl., 110 (1909), No. 24, p. 629*).—The oak mildew prevalent in northern and central Italy in 1908 attacked *Quercus pedunculata*, *Q. sessiliflora*, *Q. cerris*, and *Q. ilex*, causing the death of a large number of young plants. According to the author, the disease was probably due to *Microsphæra quercina* rather than to *M. alni*.

The Oïdium of the oak, P. A. Saccardo (*Gaz. Contadino [Treviso], 1908, No. 32; abs. in Centbl. Bakt. [etc.], 2. Abt., 25 (1909), No. 19–25, p. 531*).—It is stated that in 1907–1909 this mildew was widely prevalent throughout Italy on oak trees. It does not seem to be either *Phyllactinia suffulta*, or *Oïdium quercinum*, but more closely resembles the Oïdium form of the American mildew (*Microsphæra quercina*). The origin of this new disease is unknown, and so far no general remedy for it has been discovered.

The dissemination of a new fungus in Italy, "the white disease" of the oak, C. Fuschini (*Rivista [Conegliano], 4. ser., 14 (1908), No. 18, pp. 424–426; abs. in Centbl. Bakt. [etc.], 2. Abt., 25 (1909), No. 19–25, p. 530*).—The author gives the various localities in Italy where this Oïdium disease of the oak has appeared. It is stated that it was so prevalent in some regions that not a single young oak tree could be found that was not attacked by the fungus.

Witches' brooms and branch knots on stone pine (Pinus cembra), K. von Tubeuf (*Naturw. Ztschr. Forst u. Landw., 8 (1910), No. 1, pp. 1–12, figs. 15*).—The author claims that the witches' brooms, galls, and knots on the leaves and branches of conifers may originate from a variety of causes, such as mites, insect larvæ, fungi, and bacteria. It is stated that the witches' brooms arising from the buds on *P. cembra* and probably those on *P. montana* are caused by a mite (*Eriophyes cembræ*) and not by the mite (*Phytoptus pini*) which produces the branch knots on *P. silvestris* and *P. montana*. The branch knots on *P. cembra* are said to be due to bacteria.

A new lilac disease, H. Klebahn (*Krankheiten des Flieders. Berlin, 1909, pp. 75, figs. 45; abs. in Bot. Gaz., 49 (1910), No. 2, pp. 152, 153*).—In addition to giving an account of the more common fungi occurring on lilacs used for winter forcing in Europe, the author describes a new disease which is characterized by the attack on the twigs of the plants, the fungus killing them for a distance of several internodes. Usually only the upper internodes are killed, but often the lower parts of the stems are destroyed. The flower buds on the infected twigs do not develop, so that only leafy shoots are produced from the lower uninjured buds.

It appears that the greater part of the infection occurs while the plants are in storage. A study of the cause led to the conclusion that it is due to *Phytophthora syringæ*, a species closely allied to *P. omnivora*, but differing in some of its morphological and biological characters.

The rot of chrysanthemum flowers, H. CREPIN (*Jour. Soc. Nat. Hort. France, 4. ser., 11 (1910), Jan., pp. 52–57*).—The author divides the rot into 2 kinds, heart rot or that which destroys the receptacle, due to nutrition disturbances, and the rot of the ligules caused mainly by a fungus, *Botrytis cinerea*.

From extended experiments with various mixtures of fertilizers, the conclusion is reached that the heart rot is caused by the improper use of fertilizers in attempting to force the size of the heads. The compost, according to the author, should have more lime and potash and less nitrogen than that in common use and should be prepared from 1 to 2 years prior to using. In this case the plants at the time of flowering should have an extra quantity of nitrogen, preferably in the form of lime nitrogen.

An entirely different treatment is recommended for the rot of the ligules, as this is caused by the spores of the fungus falling on and infecting the flowers during the blooming period when the atmosphere is humid. When convenient the plants should be put under a closed shelter just before the buds open. If the weather is damp, the buds should be sprinkled with a dilute solution of nitric acid in the proportion of 2 gm. of chemically pure nitric acid to a liter of water, and vessels containing either quicklime, calcium chlorid, or hypochlorite of lime, should be placed among the plants to absorb the moisture. If the hypochlorite of lime is used, it will also give off oxidizing fumes, which are claimed to be injurious to the development of the fungus and yet not to damage the flowers. If the fumes are too disagreeable, a mixture can be used consisting of common salt 1 kg., peroxid of manganese 200 gm., sulphate of iron 500 gm., nitrate of potash 500 gm., and powdered charcoal 1 kg., made into a thick paste with water and gum arabic and then molded into cones. These when lighted will disengage oxidizing fumes, thus protecting the plants.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

The zoological record, D. SHARP (*Zool. Rec., 44 (1907), pp. XII+1521; 45 (1908), pp. XII+1395*).—These volumes contain the usual classified bibliographies covering the literature relating to all branches of zoology.

While the literature indexed in volume 44 is mainly that of 1907, entries for 1901–1906 received too late for inclusion in the previous volume are included. Similarly volume 45 indexes mainly literature issued during 1908, but in addition some entries for 1901–1907.

The state crop pest law of Louisiana and rules and regulations of the state crop pest commission, in effect November 1, 1909 (*Crop Pest Com. La. Circ. 32, pp. 223–240*).—The regulations of the crop pest commission now in force have been brought together in this circular.

Third biennial report of the secretary for the years 1908–9, W. NEWELL (*Crop Pest Com. La. Bien. Rpt., 3 (1908–9), pp. XXIV*).—A report of the work of the year on the Argentine ant, boll weevil, San José scale, and other insect pests.

Nursery inspection in North Carolina, F. SHERMAN, Jr. (*Jour. Econ. Ent., 2 (1909), No. 6, pp. 382–385*).—This is a brief account of the work as conducted in North Carolina.

Insect enemies of cantaloups, cucumbers and related plants, R. I. SMITH (*North Carolina Sta. Bul. 205, pp. 3–40, figs. 18*).—In this bulletin the important insect enemies of cucurbits are described and many illustrated by means of original photographs, summarized accounts being given of their life history and habits, and of preventive and remedial measures. The pests thus considered include cutworms, the striped cucumber beetle, cucumber flea beetle (*Epitrix cucumeris*), 12-spotted Diabrotica (*D. 12-punctata*), squash lady

beetle, melon aphis, squash bug, horned squash bug (*Anasa armiger*), banded leaf-footed plant bug (*Leptoglossus phyllopus*), northern leaf-footed plant bug (*L. oppositus*), squash borer, pickle worm and melon worm (*Diaphania hyalineata*).

Corn pests, H. GARMAN (*Kentucky Sta. Bul. 145, pp. 291-298*).—Brief popular accounts are given of the more important insect pests of corn, including the corn root aphis, corn leaf aphis, chinch bug, southern corn rootworm, cutworms, wireworms, grasshoppers, green June bug, sugar-cane borer (*Ligyrus rugiceps*), army worm and corn earworm. Two species of mice are said to be common and to cause injury in the corn fields of Kentucky, namely *Peromyscus michiganensis* and *Microtus pinetorum.*

Notes on two insects found on corn, R. L. WEBSTER (*Jour. Econ. Ent., 2 (1909), No. 6, p. 463*).—*Hemerocampa leucostigma* and *Aphis setariæ* are reported to have been found in Iowa feeding on the corn plant.

Notes on the injurious scale insects and mealy bugs of Egypt, together with other insect pests and fungi, with notes on the methods of prevention and remedies, W. DRAPER (*Cairo, 1907, pp. 28, pls. 16*).—Following a brief introduction and an account of remedies, the author considers at some length the scale and other insects common in Egyptian gardens (pp. 7-22). Twenty-five species of coccids are noted, of which *Aonidia glandulosa* from acacia and *Sphærococcus draperi* from the date palm (both named by Newstead) are new to science. A list of 27 other known African species of scale pests, prepared by R. Newstead, is also included, of which the most destructive are the red-spotted scale (*Aspidiotus ficus*) which attacks foliage of all of the citrus or orange family, the different kinds of Fici, palms, etc., and the Akee fringed scale (*Asterolecanium pustulans*), a most destructive species which attacks the branches of the fig, oleander, mulberry, plum, and a number of other plants. Other insects considered are the Egyptian cotton worm (*Prodenia littoralis*); a species of thrips which injures the foliage of vines, bitter oranges, limes, lebbek, crotons, etc.; a red spider (probably *Tetranychus telarius*), which injures cotton, the Casuarina wood-borer (*Sinoxylon* sp.), a destructive leaf-eating weevil (*Otiorhynchus* sp.) which has injured roses, the lebbek beetle (*Xystrocera globosa*), the sunt caterpillar (*Gartropacha acaciæ*), an aphid; a small pointed-shell snail (*Cochlicella barbara*) which injures lebbek, Casuarina, and other trees; the African cotton stainer (*Oxycarenus hyalinipennis*), and the small bollworm (*Stagmatophora grossypiella*).

Three species of Egyptian fungi mentioned (pp. 22-24) are *Graphiola phœnicus*, which attacks the date palm, *Alternaria violæ* the cause of the violet leaf disease, and *Puccinia carthami* which is common in Upper Egypt on the leaves of the Saf flower (*Carthamus tinctorius*).

It has been found that in irrigated fields the Egyptian cotton worm (*Prodenia littoralis*) can be destroyed by allowing the cotton to wilt from dryness, when the worms, which, after hatching on the leaves, lower themselves to the ground and remain under the soil, feeding chiefly at night, are destroyed by the heat of the unshaded ridges, the temperature of which often rises to 120-130° F. Other insect pests which attack cotton cultivated in Egypt are the Egyptian bollworm (*Earias insulana*), the small bollworm (*Stagmatophora grossipiella*), cotton cutworm (*Agrotis ypsilon*), green cotton worm (*Caradrina exigua*), the cotton stainer (*Oxycarenus halinpennis*), and a species of red spider.

Damage to gardens, rockeries, etc., is often caused by the Egyptian field-rat, *Arvicanthis niloticus*, which burrows in the soil and lawns, and also destroys the tender shoots of young bamboo and other plants. By the introduction of large rough scale tree-climbing lizards (*Agama stellio*), common in the neigh-

borhood of Alexandria and the coast, the government gardens at Delta Barrage have been cleared of this pest.

The species belonging to the genera Ceratitis, Anastrepha, and Dacus, M. BEZZI (*Bol. Lab. Zool. Gen. e Agr. R. Scuola Sup. Agr. Portici, 3 (1909), pp. 273-313, figs. 4*).—A list is given of the species of each genus with their distribution and tables for separation. Eighteen species are recorded as belonging to Ceratitis, 19 to Anastrepha, and 67 to Dacus. An extensive bibliography is appended.

New genera and species of North American Corrodentia, G. ENDERLEIN (*Bol. Lab. Zool. Gen. e Agr. R. Scuola Sup. Agr. Portici, 3 (1909), pp. 329-339, figs. 4*).—Three genera and 6 species, including 2 myrmecophilous forms (*Myrmecodipnella aptera* n. g., n. sp. from the nest of *Leptothorax nitens* and *Troctes prenolepidis* n. sp., from the nest of *Prenolepis imparis* in California), are described as new.

A contribution to the knowledge of the Thysanoptera, P. BUFFA (*Bol. Lab. Zool. Gen. e Agr. R. Scuola Sup. Agr. Portici, 3 (1909), pp. 193-196, figs. 3*).—Two genera of Tubulifera are erected for 2 new species.

A contribution to the knowledge of the Italian Lachnini, G. DEL GUERCIO (*Redia, 5 (1908), No. 2, pp. 173-359, pls. 12, figs. 32*).—The morphology, classification, general biology, and economic importance of the genera Trama, Stomaphis, Dryaphis, Lachnus, Lachniella, and Eulachnus, which compose this tribe of plant lice are considered. Tables are given for the separation of the species and numerous pen drawings are included.

Plant louse notes, family Aphididæ, C. P. GILLETTE (*Jour. Econ. Ent., 2 (1909), No. 6, pp. 385-388, fig. 1*).—Notes are given on the occurrence of a number of species of aphids of the subfamily Lachninæ.

A new enemy of the Florida orange, E. A. BACK (*Jour. Econ. Ent., 2 (1909), No. 6, pp. 448, 449*).—An account of the occurrence of *Aleyrodes howardi* in injurious numbers on orange trees at Tampa, Fla., as previously noted (E. S. R., 22, p. 254).

The San José scale.—Some sprays for its control, C. G. WOODBURY (*Indiana Sta. Bul. 138, pp. 75-86, figs. 7*).—Following a brief introductory account of the San José scale, the author reports upon the results obtained from the use of a number of insecticides during the years 1907, 1908, and 1909. All of these, with the exception of some tests with kerosene, were applied during March, examinations being made in early June and again in the fall.

Hammond's arsenated petroleum emulsion diluted with an equal volume of hot water was used on Ben Davis apple trees with but little beneficial effect. Crude oil was thoroughly effective in killing the scale, but the risks of injury are considered too great to warrant its use. Hammond's Horicum, a preparation of lime, sulphur, and other materials, was used at a dilution of 1 to 15, but its action was not decided enough to warrant its recommendation as a spray material. Kerosene emulsion, 1:9, and 1:4, made with naphtha soap and cold water was used late in the spring, when the leaves were partly grown. The young apple leaves were not seriously injured by the weaker spray, but on comparing with the unsprayed checks, no effect on the scale was apparent. The stronger emulsion killed the scale and the young foliage as well. Grasselli's lime sulphur, 1:11, was used on 30 trees, 26 of which were freed from the scale, 2 were slightly infested, and on 2 the scale was quite plentiful when the trees were examined in June. This material at the dilution used is thought to be equal to the homemade solution in effectiveness. Rex lime sulphur, 1:11, was used on peach and apple trees in comparison with the homemade lime sulphur. Both were effective, only an occasional live scale being found in October, following the March spraying of several hundred

peach trees. The results on apple trees in 1908 were also satisfactory and practically alike for both materials. Bogart's sulphur compound used on 34 trees appeared to have been without effect. Target brand, 1:20, was used effectively on 60 trees. The June examination showed 55 trees being practically free from scale, and the infestation being slight on the remainder and confined to crotches where it is thought that but little material could penetrate. Hammond's Thrip Juice, used at a strength of 1:1,000, was ineffective. Cooper & Nephews' spraying fluid, an oil spray of great spreading power, used on plum trees at a strength of 1:100, was also without beneficial effect.

The author considers homemade lime sulphur to be as effective as any material that can be recommended.

A contribution to the knowledge of the Coccidæ of Italy, G. LEONARDI (*Bol. Lab. Zool. Gen. e Agr. R. Scuola Sup. Agr. Portici, 1 (1907–8), pp. 135–169, figs. 61; Ann. R. Scuola Sup. Agr. Portici, 2. ser., 7 (1907), pp. 37, figs. 61*).—Two genera (Micrococcus and Macrocerococcus), 6 species, and 2 varieties are described in this paper as new to science.

A second contribution to the knowledge of the Coccidæ of Italy, G. LEONARDI (*Bol. Lab. Zool. Gen. e Agr. R. Scuola Sup. Agr. Portici, 3 (1909), pp. 150–192, figs. 64; Ann. R. Scuola Sup. Agr. Portici, 2. ser., 8 (1908), pp. 44, figs. 64*).—Fifteen species and 1 variety, representing 9 genera, are described as new to science in this second paper.

[Papers on the Coccidæ], G. LEONARDI (*Bol. Lab. Zool. Gen. e Agr. R. Scuola Sup. Agr. Portici, 1 (1907–8), pp. 65–134, figs. 71*).—Four papers relating to the Coccidæ are here presented. In the first 2 new species are described; in the second the species belonging to the genus Leucaspis are considered, 2 new subgenera being described; in the third 7 species occurring on the island of Java are described as new; while in the fourth an account is given of *Aonidiella auranti*, a species new to Italy.

Further information on Diaspis pentagona and methods of control, G. LEONARDI (*Bol. Lab. Zool. Gen. e Agr. R. Scuola Sup. Agr. Portici, 3 (1909), pp. 12–21; Ann. R. Scuola Sup. Agr. Portici, 2. ser., 8 (1908), pp. 12*).—This account includes a list of 26 species of trees, shrubs, etc., which serve as food plants for *D. pentagona* in Italy. A list is also given of the food plants of this species in other countries.

The identity and synonymy of some of our soft scale insects, J. G. SANDERS (*Jour. Econ. Ent., 2 (1909), No. 6, pp. 428–448, pls. 2*).—Variations in size, color and vestiture, together with the fact that many, and especially the earlier, entomologists have supposed that such sedentary insects as coccids could not live on different food plants, particularly if the hosts belong to different genera, have led to a large synonymy. In this paper the author deals briefly with the synonymy of the more common species occurring in this country, occasionally referring to their distribution in foreign countries. The species thus considered are the greenhouse orthezia (*Orthezia insignis*), pit-making oak scale (*Asterolecanium variolosum*), long-tailed mealy bug (*Pseudococcus adonidum*), citrus mealy bug, cottony maple scale (*Pulvinaria vitis* [=*innumerabilis*]), the cottony maple leaf scale (*P. acericola*), tessellated scale (*Eucalymnatus tessellatus*), soft scale, long soft scale (*Coccus elongatus*), hemispherical scale, olive scale, black scale (*Saissetia nigra*), European peach scale (*Lecanium persicæ*), frosted scale (*L. pruinosum*), hickory lecanium (*L. caryæ*), European fruit lecanium (*L. corni*), oak lecanium (*L. quercifex*), globular scale (*L. prunastri*), terrapin scale (*L. nigrofasciatum*), tulip soft scale (*Toumeyella liriodendri*), and the magnolia scale.

Corn earworm, T. J. Headlee (*Kansas Sta. Circ. 7, pp. 6*).—It is estimated that during the years 1908–9, not less than 3.5 per cent of the corn Kansas should have produced went to feed corn earworms. In the fields about Manhattan from 60 to 100 per cent of the ears were infested in 1908 and 1909, and throughout the State about 50 per cent. Examination of nearly a thousand injured ears showed about 10 per cent of the tip kernels destroyed, equivalent to about 7.5 per cent of the corn on the ears.

Additional injury was caused through the entrance of molds and bacteria, for the growth of which the excrement furnishes a medium. Unpublished feeding tests at the station also indicate that certain species of fungi found in the excrement from worms have produced in horses well marked cases of blind staggers. A brief account of the life history and habits of the pest follows.

The investigations show that 40 per cent of the injury by these worms can be avoided. Experiments of the last 2 years indicate that practically none of the pupæ winter in the soil of weed patches and alfalfa fields about Manhattan, and as garden patches are small, it appears that a great proportion of the pupæ winter in the soil of infested corn fields. Plowing such fields 5 or 6 in. deep in late fall and early winter destroyed practically 100 per cent of the overwintering pupæ. Since the moth is a strong flier, it is important that growers cooperate in dealing with the pest. Other things being equal, late planted corn suffered more severely than that which was planted early, this difference being due to the fact that late planted corn was in its most attractive stage (in silk) during the time the third and largest brood of moths was on the wing, while the early planted corn had finished silking by the time the mass of this brood was ready to emerge. Corn planted May 1 experienced about 40 per cent less damage than corn planted June 15 or later, 33 to 35 per cent less than that planted June 1, and 16 to 20 per cent less than that planted May 15. While the variety of corn which requires the less time to mature showed the smallest amount of injury, the difference was so small as hardly to be worth considering.

The codling moth and how to control it by spraying, E. D. Sanderson (*New Hampshire Sta. Bul. 143, pp. 61–106, figs. 23*).—The information gained in investigations previously noted (E. S. R., 21, p. 758) is here brought together in popular form. The life history and habits of the moth are first considered, followed by an account of spraying experiments conducted during 1906, 1907, and 1908. The care of the orchard in dealing with the pest is also discussed and directions given for spraying.

During 1909, cooperative demonstration experiments in spraying were made at several places, from 10 to 20 trees being sprayed on each farm by the station representative. The owner's reports of the results obtained in the orchards thus sprayed are quoted from.

A postal card census of the extent of spraying in 1909, taken through selectmen and the grange, showed that out of 111 towns reporting, there were 71 in which one or more persons sprayed, while in 40 no spraying was done. The experience of those who sprayed is presented.

The bulletin closes with accounts by a number of growers of the results obtained from spraying.

Notes on the parasites of the Saturniidæ, W. F. Fiske and W. R. Thompson (*Jour. Econ. Ent., 2 (1909), No. 6, pp. 450–460*).—During the course of work with parasites of the gipsy and brown-tail moths in 1908–9, collections were made in eastern Massachusetts and southern New Hampshire of the cocoons of *Samia cecropia*, a total of 370 being collected. The parasitism is

compared with that observed by Dr. J. B. Smith in collections made in New Jersey and on Long Island, as previously noted (E. S. R., 20, p. 953).

Of the 370 pupæ 151 were found to be healthy, 123 were parasitized, and 96 were dead but not parasitized. A comparison of those collected in the two States shows that while the percentage of dead from other causes than parasitism remained nearly constant, the parasitism in New Hampshire was almost twice as high as that in Massachusetts. Enormous variations in parasitism were found in different lots from the same town or from towns closely adjacent.

Observations were also made of the parasitism of 997 cocoons of *Callosamia promethea* and of 40 of *Telea polyphemus*, which were collected at the same time. The number and percentage of cocoons parasitized by the several species of parasites are shown in the following table:

Parasitism of cocoons of native silkworms collected in Massachusetts and New Hampshire during 1908–9.

Species of parasite.	*C. promethea.*		*S. cecropia.*		*T. polyphemus.*	
	Number.	*Per cent.*	*Number.*	*Per cent.*	*Number.*	*Per cent.*
Ophion macrurum	326	32.7	27	7.3	4	10.0
Spilocryptus extremis	109	10.9	4	1.1	1	2.0
Theronia fulvescens	4	.4				
Diglochis omnivorous			2	.5		
Tachina (?) sp.	5	.5	46	12.4	1	2.5
Achætoneura frenchii			44	11.9		
Total	444	44.5	123	33.2	6	15.0

It is considered quite possible that parasitism of the eggs is at times a considerable factor in the control of these moths. It is also concluded from limited observations that the parasites of the immature caterpillars outrank in importance those which attack the larger caterpillars and pupæ. The interrelation of the primary parasites and the secondary parasites of these species are also considered.

Contributions to the biology of Pieris brassicæ and some of its parasites and hyperparasites, G. Martelli (*Bol. Lab. Zool. Gen. e Agr. R. Scuola Sup. Agr. Portici, 1 (1907–8), pp. 170–224, figs. 12; Ann. R. Scuola Sup. Agr. Portici, 2. ser., 7 (1907), pp. 57, figs. 12*).—In this paper particular attention is paid to parasites and hyperparasites of *P. brassicæ*.

Contributions to the knowledge of Dicraneura vinula and some of its parasites, G. Martelli (*Bol. Lab. Zool. Gen. e Agr. R. Scuola Sup. Agr. Portici, 3 (1909), pp. 239–260, figs. 12*).—Studies of the bionomics of *D. vinula* are reported. Notes on *Encyrtus vinulæ* and *Eupelmus* sp. which attack the eggs and *Paniscus testaceus* which attacks the larvæ are included, and a list is given of 16 other parasites of the moth which have been recorded by various authors. A bibliography of 43 titles is appended.

Notes on fruit flies, W. W. Froggatt (*Estac. Cent. Agron. [Cuba] Rpt. (English Ed.), 2 (1905–1909), pt. 2, pp. 117–121, pl. 1*).—The Mediterranean fruit fly (*Halterophora capitata*) and the Mexican fruit fly (*Trypeta ludens*) are the species noted.

A new species of Asphondylia which attacks the lupine, F. Silvestri (*Bol. Lab. Zool. Gen. e Agr. R. Scuola Sup. Agr. Portici, 3 (1909), pp. 3–11, figs. 11; Ann. R. Scuola Sup. Agr. Portici, 2. ser., 8 (1908), pp. 11, figs. 11*).—A new cecidomyid, the larva of which has been found to injure the pod of *Lupinus albus* near Nola, Italy, is described as *Asphondlyia lupini*. Its life history,

habits, and injury are briefly set forth. Notes are included upon 2 parasites, *Eurytoma dentata* and *Pseudocatolaccus asphondyliæ*, which have been found to attack it.

Illustrations of African blood-sucking flies, other than mosquitoes and tsetse flies, E. E. AUSTEN (*London: Brit. Mus. Nat. Hist., 1909, pp. XV+221, pls. 13, figs. 3; rev. in Nature [London], 82 (1909), No. 2096, pp. 241, 242; Jour. Roy. Army Med. Corps, 13 (1909), No. 5, pp. 607, 608*).—Chapters are devoted to the Chironomidæ; the Psychodidæ, including an account of the *Phlebotomus papatasii* which transmits the three-day fever of Dalmatia; the Simulidæ; Tabanidæ with the four principal genera—Tabanus, Hæmatopota, Pangonia, and Chrysops; the Muscidæ; the Hippoboscidæ; and geographical lists, respectively.

A catalogue of the Coleoptera (*Coleopterorum Catalogus. Berlin, 1910, pts. 1, pp. 11; 2, pp. 32; 3, pp. 80; 4, pp. 134*).—Part 1 of this catalogue, which takes up the Rhysodidæ, was prepared by R. Gestro; part 2, taking up the Nilionidæ, Othniidæ, Ægialitidæ, Petriidæ and Lagriidæ, and part 3, the Alleduliidæ, are by F. Borchmann; and part 4, containing the Ipidæ, is by M. Hagedorn.

The hibernation of the boll weevil in central Louisiana, W. NEWELL and M. S. DOUGHERTY (*Crop Pest Com. La. Circ. 31, pp. 163–219, pl. 1, figs. 5*).—An investigation of the hibernation of the boll weevil extending from September 15, 1908, to July 15, 1909, and conducted at Mansura, Avoyelles Parish, La., is here reported in detail. The results and conclusions have been summarized by the authors as follows:

"Out of 16,281 adult boll weevils confined in the 16 cages, 3,360, or 20.63 per cent lived through the winter successfully. Destruction of all cotton plants before October 15 resulted in only 3 per cent of the weevils surviving the winter. Letting the cotton plants stand in the field until about Christmas resulted in over 40 per cent of the weevils living through the winter to attack the next crop. It was found that starvation of the boll weevils before they entered hibernation in fall was more effective in causing their death than was cold or wet weather during the winter. The average time that the weevils remained in hibernation was 159 days. The extreme length of time that any weevil lived without food, while in hibernation, was 255 days, or $8\frac{1}{2}$ months. When the cotton plants are allowed to stand in the fields until killed by cold, the average weevil has to go without food for only about 94 days. When cotton plants are destroyed before October 12 the average weevil must go over 6 months without food or starve to death. Early destruction of the cotton plants results in starvation of hordes of boll weevils. Moss on the forest trees was found to shelter an enormous number of boll weevils during the winter. Of the weevils that spent the winter in Spanish moss, 38 per cent lived through the winter. Of those hibernating in average materials only 20 per cent lived through. Boll weevils passing the winter in moss emerged from hibernation much later than those hibernating in other materials. Moss-covered trees near the cotton field increase weevil infestation. The length of time that the weevils live after leaving hibernation in spring has an important bearing on the problems of poisoning the weevil and of when to plant the crop to best advantage. The average overwintering boll weevil lived 10.7 days after leaving winter quarters. The maximum length of life, after leaving hibernation, was 44 days."

The authors consider these results to be indicative of the weevil's hibernating habits in most of the alluvial territory in the Mississippi, Red River, Black River, and Ouachita valleys of Louisiana, as Mansura has practically the same prevailing temperatures, elevation, and rainfall.

Experiments with powdered arsenate of lead as a practical boll weevil poison, W. NEWELL and G. D. SMITH (*Crop Pest Com. La. Circ. 33, pp. 252–333,*

pl. 1, figs. 3; abs. in Jour. Econ. Ent., 3 (1910), No. 2, pp. 253–255).—The encouraging results obtained from cage experiments with powdered arsenate of lead during the spring of 1908 as previously noted (E. S. R., 20, p. 1150), led the authors to inaugurate field tests. Small fields of cotton in a number of localities were treated with the poison during the early summer of 1908, but most of these were destroyed by overflows, etc. One series of experiments at Mansfield, however, was carried out and is here reported.

On May 28, powdered arsenate of lead was applied to approximately one-half of a 9-acre field by means of a Champion dust sprayer, 1 lb. per acre being used and pains being taken to force the powder well into the buds and terminal leaves. Careful counts, made on July 6, of infested squares and bolls in the poisoned and nonpoisoned plats did not indicate any pronounced advantage in the poisoned plat, but when the cotton was picked 5,068 lbs. was taken from the poisoned plat of 4.83 acres, against 4,682 lbs. from the nonpoisoned plat of 4.712 acres.

In experiments with a liquid spray of lead arsenate the gain was found to be too small to justify the expense. In order to determine whether any considerable number of weevils could be killed when squares and bolls were present on the plants, cage experiments with powdered arsenate were made during July and August in a field near Alexandria. The percentage of weevils killed by the arsenate on fruiting cotton was considerably smaller than the percentage killed on small cotton in the budding stage, but the outcome of these experiments indicated that something might be accomplished by continuing the applications of powdered arsenate for a time after the first squares appear on the plants in spring. These results led to experiments during 1909, 8 at Lakeland, Pointe Coupee Parish, 1 at Woodside, Avoyelles Parish, 2 at Shaw, Concordia Parish, and 1 at Mansfield, De Soto Parish. All of the field experiments were located in localities where conditions were thought to be most favorable to the weevils, in order that the poison could be given the severest possible test. The various experiments are described in detail; powdered arsenate of lead was used in all, being applied by means of the Champion dust gun. The results have been summarized in the following table:

Summary of field experiments with powdered arsenate of lead.

Experiment.	Number of applications powdered arsenate.	Total amount of arsenate used per acre.	Cost of poisoning per acre.	Yield of seed cotton per acre.		Net profit per acre.
				Poisoned cotton plat.	Check plat.	
		Pounds.		*Pounds.*	*Pounds.*	
Mansfield, 1908	1	1.0	$0.42	1,049.0	993.0	$2.00
Lakeland A, 1909	2	2.2	.64	246.3	82.1	7.34
Lakeland B, 1909	3	4.7	1.33	485.7	180.3	13.55
Lakeland C, 1909	4	7.0	2.02	208.7	161.6	.27
Lakeland D, 1909	5	10.6	2.96	672.7	127.9	23.54
Lakeland E, 1909	6	14.5	3.99	342.9	103.1	7.69
Lakeland F, 1909	7	23.3	6.16	281.7	79.8	3.63
Lakeland G, 1909	10	51.0	12.99	392.0	76.0	2.35
Lakeland H, 1909	10	50.8	12.94	198.0	....	7.07
Woodside, 1909	8	44.0	11.41	533.7	130.2	8.16
Shaw A, 1909	7	48.0	12.39	692.7	342.5	4.68
Shaw B, 1909	5	26.5	6.88	1,167.5	567.2	22.32
Mansfield, 1909	5	17.0	4.54	1,255.3	807.1	17.22

In practically every instance where the powdered arsenate was applied with a Champion dust gun in the right manner, the right amount, and at the right time, the outcome was profitable. As is shown in the above table, the highest

net profit was obtained from plats in which 5 applications were made. "It is not impossible that among the earliest maturing varieties there are some with which the use of the powdered lead arsenate will prove more profitable than with others. In the experiments at Lakeland, where conditions in all plats (with one exception) were practically alike, there was a marked difference in the increased production obtained by the use of the powder on different varieties. Thus the experiment with Peebles Chosen showed a profit of but 27 cts. an acre from the use of the arsenate, while the Rublee Antiboll Weevil cotton, in the plat adjoining, showed a profit of $23.54 per acre from its use. Whether the variety of cotton had anything to do with this marked difference in the results of poisoning we are unable to say, having no other experiments with either of these varieties." Other factors mentioned as operating to increase or decrease the amount of cotton made by the use of this poison include fertilizers, character of soil, rains, heat, parasites, and other cotton insects.

It is concluded that the best results will be obtained from 5 applications, made from 5 to 7 days apart, the first to be made at the time the first squares form. Following the first and second applications of from 2 to 2½ lbs. per acre, the amount of arsenate should be increased until at the fifth from 4 to 7 lbs. per acre should be used. The authors consider the key to success to lie in getting the poison with force into every terminal bud, into every blossom, and into the involucre of every square. It is pointed out that the price paid for poison, cost of labor, and the market price received for lint and seed all go to determine the amount of profit or loss following the use of the arsenate.

An experiment conducted in midsummer at Baton Rouge is thought to demonstrate the futility of trying to attack the boll weevils with the arsenate of lead late in the season. Experiments made by private parties are also considered.

The review is by E. D. Sanderson.

Additional notes upon the breeding of the coffee-bean weevil, E. S. Tucker (*Jour. Econ. Ent., 2 (1909), No. 6, pp. 373–381*).—Observations of the coffee-bean weevil made since the paper previously noted (E. S. R., 21, p. 653) was submitted for publication, are reported.

The species has been found to breed in cornstalks during the winter and spring months without interruption, although a large mortality of all stages is apparently caused by cold weather. In August the weevil was found breeding in green cornstalks at Alexandria, La. As the attacks occur more commonly on leaves than stalks, the author concludes that the weevils first breed in the base of the leaves and later attack the joints, probably as each in turn begins to dry. Stalks examined on August 3 were in a green sappy condition, some still having fresh, green leaves although no leaves were found attacked except dried ones. One-half of the cornstalks examined at Matsura, La., in March were injured and old cornfields examined at Victoria, Tex., the same month showed some 10 per cent of the stalks to have been attacked. Field observations have failed to bring out any definite evidence that green cotton bolls are attacked. A species of mite found attacking the pupæ has been identified as *Tyroglyphus breviceps*

An annotated list is given of the literature consulted.

Papers on cereal and forage insects.—The clover root curculio, V. L. Wildermuth (*U. S. Dept. Agr., Bur. Ent. Bul. 85, pt. 3, pp. 29–38, figs. 5*).—While the clover root curculio (*Sitones hispidulus*) has never been so abundant in this country as totally to destroy a clover crop, the author believes that injuries which have before been either unnoticed or considered as due to other clover pests were partly the work of the adults and larvæ of this beetle. "From the history of other species of insects that have been imported into this country, and from the fact that late in November, 1909, at two localities, namely,

Corning, N. Y., and Marion, Pa., the adults were found to have practically eaten up the foliage of clover plants, there is reason to believe that this one may become destructive to the clover crop in future years." In a review of the history of this curculio in foreign countries, it is shown to be widely distributed throughout England, Europe, and parts of Siberia, and it has been reported by one writer as a source of considerable injury in the vicinity of Dirschau, western Prussia.

In this country, the species was first collected by Le Conte at Long Branch, N. J., in 1876. It has since been collected in Maryland, District of Columbia, Pennsylvania, New York, Maine, Ohio, Indiana, and Washington. But little was known of its life history until 1909, during the course of which year the author followed its life cycle in the District of Columbia. It hibernates as an adult, beneath rubbish, leaves, etc., close to the ground. The adults come forth with the first warm days of the early spring and the female very soon begins oviposition. On May 4, almost fully developed larvæ were found by the author on clover roots, eggs for which must have been deposited during the latter part of March. The female deposits promiscuously a large number of whitish eggs on the leaves and ground, or even on the side of the cage when confined. In the field eggs were found adhering to the lower leaves of both red clover and alfalfa. It is very probable, however, that in the natural state the eggs are usually deposited at or near the surface of the ground. The egg period is 13 days in duration.

The larvæ immediately after hatching out go down into the ground, and the pupal stage is passed in an earthen cell, which is oval in outline, about $\frac{3}{16}$ in. long, and half as large in diameter. The time required for the pupal stage is from 8 to 10 days, and that required from the deposition of the eggs to the appearance of adults was from 38 to 43 days, thus making from 17 to 21 days for the larval stage. As the investigations of clover roots at various intervals during October and November failed to reveal any larvæ, the author concludes that a second fall brood is wanting in the District of Columbia. The several stages of the curculio are described and figured.

The larvæ feed on the roots of the food plants, large cavities being eaten along the main roots; often these are in the form of a groove, containing the feeding larvæ. The adults feed on the leaves, eating out irregular patches from the margin. Red clover appears to be the most common choice as a food, while white clover, crimson clover, and alsike clover are all fed upon to a greater or less extent by both the adults and larvæ, and alfalfa seems to be a common food plant for both.

The larvæ were found to be attacked by a fungus but no insect parasites were discovered. A list is given of 14 species of birds which the Biological Survey of this Department has found to feed upon the adults of the curculio.

Up to the present time the depredations of the pest have apparently been too limited and inconspicuous to call for investigations along the line of remedies and preventives. It is considered probable that the system of short crop rotation has assisted in limiting their number.

A bibliography of 16 titles, which includes the more important papers relating to this species, is appended.

The rose curculio (Rhynchites bicolor) in Massachusetts, B. N. Gates (*Jour. Econ. Ent., 2 (1909), No. 6, pp. 465, 466*).—During May and June this curculio became so numerous on the rugosa or Japanese rose in the vicinity of Worcester, Mass., as to ruin nearly every blossom by its attack upon the swelling rosebuds. Shortly after attacking the Japanese rose, it appeared on the hardy perennial varieties at the time when they commenced to show color and was found a week later on wild roses in fields at North Grafton.

Notes on honeybees gathering honeydew from a scale insect (Physokermes piceæ), B. N. GATES (*Jour. Econ. Ent., 2 (1909), No. 6, pp. 466, 467*).—The author observed honeybees gathering honeydew from *P. piceæ*, infesting spruces at Amherst, Mass. This scale is a European species recently introduced in the United States and known to occur at 3 points in Massachusetts. Because of its numerous parasites, the species is not likely to become a serious pest of the spruces.

Ants, their structure, development, and behavior, W. M. WHEELER (*New York, 1910, pp. XXV+663, pl. 1, figs. 286*).—The first part of this work, comprising chapters 2–10, is largely morphological, while the remaining chapters, 11–30, are devoted to ethological considerations. The several appendixes include methods of collecting, mounting, and studying ants; a key to the subfamilies, genera, and subgenera of the North American Formicidæ for the identification of the workers; a list of described North American ants; methods of exterminating noxious ants; and an extensive bibliography, which is brought down to the close of 1908.

Ants collected by Prof. F. Silvestri in Mexico, W. M. WHEELER (*Bol. Lab. Zool. Gen. e Agr. R. Scuola Sup. Agr. Portici, 3 (1909), pp. 228–238*).—An annotated list of 22 forms, of which 4 species and 2 varieties are described as new to science.

Ants collected by Prof. F. Silvestri in the Hawaiian Islands, W. M. WHEELER (*Bol. Lab. Zool. Gen. e Agr. R. Scuola Sup. Agr. Portici, 3 (1909), pp. 269–272*).—Notes on 7 species, of which *Cerapachys* (*Syscia*) *silvestrii* is described as new.

Contributions to the knowledge of the Chalcididæ of Italy, L. MASI (*Bol. Lab. Zool. Gen. e Agr. R. Scuola Sup. Agr. Portici, 1 (1907–8), pp. 231–295, figs. 47; 3 (1909), pp. 86–149, figs. 45; Ann. R. Scuola Sup. Agr. Portici, 2. ser., 7 (1907), pp. 67, figs. 47; 8 (1908), pp. 66, figs. 45*).—In the first paper a genus (Atoposoma) and 6 species, representing 5 additional genera, are described as new. In the second paper 1 genus (Pseudocatolaccus) and 7 species, representing 5 additional genera, are described as new to science.

Contributions to the knowledge of hymenopterous parasites, F. SILVESTRI (*Ann. R. Scuola Sup. Agr. Portici, 2. ser., 8 (1908), pp. 57, figs. 62*).—This account has been previously noted from another source (E. S. R., 21, p. 557).

An account of Prospalta berlesei, particularly of the first stages in its development, F. SILVESTRI (*Bol. Lab. Zool. Gen. e Agr. R. Scuola Sup. Agr. Portici, 3 (1909), pp. 22–28, figs. 6; Ann. R. Scuola Sup. Agr. Portici, 2. ser., 8 (1908), pp. 9, figs. 6*).—Bionomic studies of *P. berlesei* are reported.

Information on Eurytoma strigifrons, a parasite of Apanteles glomeratus and Anilastus ebeninus, G. MARTELLI (*Bol. Lab. Zool. Gen. e Agr. R. Scuola Sup. Agr. Portici, 3 (1909), pp. 261–264*).—Brief biological notes are given.

The geographical distribution of American ticks, W. A. HOOKER (*Jour. Econ. Ent., 2 (1909), No. 6, pp. 403–428*).—In this article lists are given of the species of ticks occurring in the various political divisions of the New World. The species which occur in the United States have been brought together in a locality list.

FOODS—HUMAN NUTRITION.

The glycogen content of beef flesh, I, P. F. TROWBRIDGE and C. K. FRANCIS (*Jour. Indus. and Engin. Chem., 2 (1910), No. 1, pp. 21–24*).—In this study of the quantitative estimation of glycogen and the factors which influence it, animals slaughtered from 2 or 3 to 9 hours after regular morning feeding were used

and the glycogen determined in the liver and lean muscle. The authors consider the recorded data insufficient for final deductions but believe that it is possible from their results to point out probable factors which may influence the glycogen content.

Quotations from the authors' summary follow:

"It is quite possible the older the animal the greater the tendency to store the glycogen. All of the animals 3 years old or over show more than 1 per cent of glycogen in the liver.

"The condition (fatness) of the animal may favor the storing of glycogen. Our results are a little contradictory. . . .

"The length of time that elapses after feeding before the animal is slaughtered seems to be a very important factor in determining the amount of glycogen that remains stored in the organs and muscles of the animal. . . .

"While we have just considered some of the factors that may influence the amount of glycogen that the animal stores up, it must not be overlooked that the time that elapses from the killing of the animal until the sample is digesting in the alkali may be the chief factor that influences the amount of glycogen found. With our first animals slaughtered no exact record was taken of the time. The sample was always sent to the laboratory as soon as obtained and the chemist immediately went to work to prepare the sample for the analysis, thinking in this way to have all results comparable. The failure of the results to establish any definite law and knowing how rapidly the acidity of flesh increases under similar conditions, led us to consider more carefully the element of time as measuring perhaps the amount of enzymatic reaction. . . .

"These results would seem to suggest that an appreciable amount of enzymatic hydrolysis may take place between the weighing out of the samples. . . . If further work confirms the present results as to a rapid hydrolysis of the glycogen, it will show how utterly worthless the glycogen determination is for the detection of the presence of horseflesh. . . .

"These results indicate that at 10° C. or lower no appreciable hydrolysis of the glycogen takes place. This problem is to be studied further during the ensuing year."

Test in handling and storage of poultry, MARY E. PENNINGTON (*Nat. Provisioner, 42 (1910), Nos. 4, pp. 16, 23, 24; 5, pp. 23, 24*).—The results of experiments carried on by the U. S. Department of Agriculture are summarized and discussed with reference to dry-picked and scalded birds stored for varying lengths of time in different packages, and the results of storing drawn and undrawn poultry (E. S. R., 20, p. 560) are given.

Among other topics data are summarized regarding the bacteria present in poultry stored in different ways and their relation to putrefaction.

"If there is any doubt about the class into which these birds fall, so far as keeping quality is concerned, we can classify them with a fair degree of accuracy in the laboratory, since bacteria mean decomposition, and the more we have the more profound will be the changes in the chicken, changes putrefactive in character, which we simply designate as change or decomposition.

"The crux of this whole matter seems to be summed up in a very few words—prompt storage, dry picking, dry chilling. . . . If we can apply those elementary principles to our poultry industry, not only the producer, but the warehouseman and the consumer will greatly benefit."

Preserved chopped meat, E. BAIER (*Ber. Nahrmtl. Untersuch. Amt. Landw. Kammer Brandenb., 1908, p. 8; abs. in Ztschr. Untersuch. Nahr. u. Genussmtl., 19 (1910), No. 2, p. 102*).—Chopped meat which had caused severe illness in a number of persons was examined. It contained preservative salt and was odorless and noticeably red after being kept for some days.

The occurrence of inactive lactic acid in a meat preparation, E. SALKOWSKI (*Ztschr. Physiol. Chem., 63 (1909), No. 4, pp. 237–247*).—According to the author, the sarcolactic acid originally present in meat juice is changed entirely, or almost entirely, into inactive lactic acid if the material is kept a sufficient time. The nature of the change was studied and the author does not think that it is improbable that it has to do with the blood pigment.

The occurrence of yeast and Oïdium on slimy sausage casing, H. KÜHL (*Apoth. Ztg., 24 (1909), No. 102, pp. 956, 957*).—From his investigation of the subject the author concludes that the occurence of the micro-organisms under consideration on slimy sausage casing can not be regarded as a matter of no importance.

Meat and the provisioning of troops in time of war, MARTEL (*Rev. Sci. [Paris], 48 (1910), I, No. 3, pp. 65–74*).—Refrigeration, canning, and other questions connected with supplying meat to troops in the field are discussed with reference to the French and other armies.

A chemical and bacteriological study of fresh eggs, MARY E. PENNINGTON (*Jour. Biol. Chem., 7 (1910), No. 2, pp. 109–132*).—In this paper, which was presented at the Congress of Applied Chemistry, held in London in June, 1909, the author reports the results of studies of the proximate composition of Plymouth Rock and Leghorn eggs as well as the nitrogen partition in the white and the character of the fat in the yolk.

On an average the white of Plymouth Rock eggs contained 1.54 per cent of total nitrogen, 0.171 per cent of nitrogen noncoagulable by heat, 0.075 per cent of albumose nitrogen, and 0.005 per cent of amino nitrogen. The yolk of the Plymouth Rock eggs showed on an average an iodin value of 62.8, saponification number of 179.9, acid value of 5.8, ester value of 171.2, Hehner number of 76.1, calculated oleic acid 2.92 per cent, and an index of refraction of 1.4626. The values as reported for the Leghorn eggs are very similar.

A study of the bacterial content of eggs was reported, the number found and listed being 36 varieties per 100 eggs.

"In the 57 experiments 18 had a decidedly greater number of bacteria in the yolk; 11 had the majority in the white and 21 had an almost even distribution; 7 were sterile."

Both Plymouth Rock and Leghorn eggs were used and spring and autumn and fertilized and unfertilized eggs were compared. According to the author, it may be that the differences in bacterial content which were observed depend upon breed and the conditions under which the eggs were laid as well as the season. In general, the autumn eggs contained a greater number of bacteria than the early spring eggs.

"That perfectly fresh eggs from healthy hens may contain bacteria is a generally recognized fact. That they are sometimes sterile is also admitted. Whether the organisms enter the egg during its passage down the oviduct or whether they penetrate the shell either at the time of laying or afterward are questions on which opinions are contrary. The fact that certain pathogenic organisms characteristic of fowls, as vibros of chicken cholera, have been found in the egg argues for infection in the oviduct, as do the presence of foreign bodies, such as small insects; while the trade experience indicates that organisms can enter through the shell."

Egg goods and egg substitutes, BUJARD, MEZGER, and MÜLLER (*Ber. Untersuch. Amt. Stuttgart, 1907, p. 3; abs. in Ztschr. Untersuch. Nahr. u. Genussmtl., 18 (1909), No. 12, p. 764*).—Data are given regarding the composition of 2 samples of such goods.

Lard, A. McGILL (*Lab. Inland Rev. Dept. Canada Bul. 193, pp. 13*).—Seventy samples of lard were examined, of which the greater proportion were

genuine. Only one sample contained as much as 1.18 per cent water, which is just a little more than the limit (1 per cent), which the bulletin recommends be made legal.

A memorandum by C. C. Forward is incorporated in the bulletin, on methods of analysis, with special reference to the use of differences in the melting point as a means of detecting adulteration with tallow.

"It is hoped that the total range of error on any sample of lard tested may be so reduced as to make it possible to detect with certainty an adulteration of less than 10 per cent tallow."

Butter goods, E. Baier (*Jahresber. Nahrmtl. Untersuch. Amt. Landw. Kammer Brandenb., 1908, p. 15; abs. in Ztschr. Untersuch. Nahr. u. Genussmtl., 19 (1910), No. 5, pp. 289, 290*).—The question of the substitution of oleomargarine for butter in bakers' goods is discussed.

Banana margarin (*Jour. Agr. Trop., 10 (1910), No. 103, p. 16*).—In a brief note it is stated that a mixture of banana flour, milk, and butter has been marketed as a butter substitute.

Butter flavor, E. Baier (*Jahresber. Nahrmtl. Untersuch. Amt. Landw. Kammer Brandenb., 1908, p. 15; abs. in Ztschr. Untersuch. Nahr. u. Genussmtl., 19 (1910), No. 5, p. 289*).—The author describes a product designed to impart a butter flavor to bakers' goods.

Flavoring for bakers' goods, M. Mansfield (*Jahresber. Untersuch. Anst. Nahr. u. Genussmtl. Allg. Österr. Apoth. Ver. Wien, 21 (1908–9), p. 7; abs. in Ztschr. Untersuch. Nahr. u. Genussmtl., 19 (1910), No. 5, p. 290*).—The material examined was found to consist of colored and flavored wheat flour.

Milling of wheats, J. C. Brünnich (*Ann. Rpt. Dept. Agr. and Stock [Queensland], 1908–9, pp. 57, 64–71*).—The yield of flour and other milling products, the character of the gluten, color and texture of flour, its chemical composition, and other data are included in this report of milling tests with a large number of samples of wheat of different varieties.

Notes on flour strength, F. B. Guthrie and G. W. Norris (*Agr. Gaz. N. S. Wales, 20 (1909), No. 12, pp. 1100–1105, dgms. 5; Austral. Baker, 13 (1909), No. 10, pp. 21–24*).—The tests of the water-absorbing power of different grades of flour showed considerable variations but general conclusions as to their cause were not drawn. In tests of the effect of blending hard and soft wheats on the water-absorbing power of the resulting flour, it appeared that the most favorable blend was an equal mixture of the two sorts. Studies of the effect of mixing different grades of flour upon the water-absorbing power of the resulting blend led the authors to conclude that it would "appear more profitable to the baker to blend his flours than to use flour of one quality from a mixture of wheats, and that the addition of a small proportion of weak flour to his strong flour, so far from reducing the water-absorptive power of the latter, actually increases it."

When the baking quality of these flours and blends was studied it was found that "not only were the volumes of the strong flour loaves larger, but the admixture of a small proportion of the weak flour gave a loaf of larger volume than was obtained from the strong flour used alone."

Microscopical analysis of bread of the fourth or fifth century, H. V. Rosendahl (*Svensk Bot. Tidskr., 3 (1909), No. 1, pp. 41–46, figs. 8*).—A charred fragment identified as bread and attributed to the fourth or fifth century was found on examination to have been made from coarsely ground rye, a result which is in accord with the fact that until late in the fifteenth century rye was the only grain grown in Sweden.

The Kafir bread plants, G. V. Nash (*Jour. N. Y. Bot. Gard., 10 (1909), No. 120, pp. 275–277, pl. 1*).—Several cycas species are described, the farinaceous

stems of which are used by African natives as a source of starchy food. The stems, it is said, are buried in the ground for several months; the mucilaginous central pith is then taken out and dried and made into cakes resembling bread. On this account the name "Kafir-bread" has been bestowed upon the plants, especially upon the species known as *Encephalartos caffer*.

The nutritive value of Annam and Tonkin yams, P. EBERHARDT and M. BLOCH (*Bul. Sci. Pharmacol., 16 (1909), No. 9, p. 509; abs. in Chem. Zentbl., 1909, II, No. 20, p. 1756*).—Proximate analyses of 6 named varieties of cultivated yams (*Dioscorea aculata*) are reported and the cultivation of yams and related questions are discussed with reference to local conditions.

Sea kale industry, L. MAYNARD (*Daily Cons. and Trade Rpts.* [*U. S.*], *1910, No. 3693, p. 13*).—Methods of gathering and curing an edible seaweed (*Crambe maritima*) in waters adjacent to the Maritime Province of Siberia and the island of Saghalien are described and statistics regarding the extent of the trade are given.

The cholin content of some edible fungi, K. POLSTORFF (*Wallach-Festschr., pp. 579–583; abs. in Chem. Zentbl., 1909, II, No. 24, pp. 2015, 2016*).—According to the author's analyses *Cantharellus cibarius*, mushrooms (*Agaricus campestris*), and *Boletus edulis* contain, respectively, 0.01, 0.015, and 0.0056 per cent cholin.

The composition of American beet sugar molasses, G. A. MEYER (*Ztschr. Ver. Deut. Zuckerindus., 1909, No. 646, II, pp. 1019, 1020*).—Analyses, including mineral matters, are reported of beet sugar molasses from California and Colorado.

Fruit jams, A. MCGILL (*Lab. Inland Rev. Dept. Canada Bul. 194, pp. 23*).—Of 146 samples collected in Canada, 22 were labeled compounds and 8 were canned fruits. Of the remaining 116 samples sold as jams, 108 were found to be genuine, 7 doubtful, and 1 adulterated.

The legal definition of jam (marmalade) and compound jam is discussed.

Lime fruit juice (lime juice), A. MCGILL (*Lab. Inland Rev. Dept. Canada Bul. 197, pp. 15*).—The present report comprises data regarding 9 samples sold as lime juice cordials, 42 judged to be genuine lime juice, 13 judged to be abnormal but not declared to be adulterated, and 12 found to be adulterated. The so-called lime juice cordials with few exceptions contained salicylic acid as a preservative, though the fact was not mentioned on the label.

Methods of examination are briefly discussed

Lemon flavoring extract, A. MCGILL (*Lab. Inland Rev. Dept. Canada Bul. 198, pp. 13*).—Of the 75 samples examined, only 13 contained above 1 per cent of lemon oil, while 60 contained less than 0.5 per cent. It was also found that 49 samples were made with alcohol of less than proof strength, while 27 contained alcohol of only about half proof strength.

Cream of tartar, A. MCGILL (*Lab. Inland Rev. Dept. Canada Bul. 195, pp. 25*).—Of 209 samples of cream of tartar examined 29 were found to be adulterated.

Final report of the royal commission on whisky and other potable spirits, JAMES OF HEREFORD ET AL. (*London: Govt., 1909, pp. 111+47*).—In this report the royal commission give the conclusions which were reached regarding whisky and other potable spirits and the evidence upon which their report was based.

Quotations from the discussion of whisky follow:

"Whilst, therefore, the evidence . . . is sufficient to explain the conflicting definitions of whisky which have been put forward, it appears to us that whisky as a commercial product is regarded both by the manufacturers and by the public as a spirit made from no other materials than malt and unmalted grain, and is as a matter of fact so made at the present time; and we feel confident

that the restriction of the application of the term 'whisky' to a product manufactured from malt and grain would meet with no opposition from any of the traders in whisky. . . .

"We are unable to recommend that the use of the word 'whisky' should be restricted to spirit manufactured by the pot still process. . . .

"That the flavor obtained by the distillation of spirit from a mash of which maize is the principal constituent differs materially from the flavor obtained from a mash of malt or malt and unmalted barley is indisputable. But we see no valid reason for excluding the use of maize in the manufacture of whisky. There is no evidence to show that maize is not a perfectly wholesome material, and that being so we can not recommend the prohibition of an article from which is produced a very large proportion of the whisky of commerce, by which we mean the spirit which is regarded by a large section of the trade and accepted by the public as whisky. . . .

"In our opinion the use of the terms 'Scotch' and 'Irish' as applied to whisky can not be denied to any whisky distilled in Scotland and Ireland respectively."

The general conclusion of the commission "is that 'whisky' is a spirit obtained by distillation from a mash of cereal grains saccharified by the diastase of malt; that 'Scotch whisky' is whisky, as above defined, distilled in Scotland; and that 'Irish whisky' is whisky, as above defined, distilled in Ireland."

With reference to brandy, the conclusion of the commission "is that the term 'brandy' is applicable to a potable spirit manufactured from fermented grape juice and from no other materials.

"But we are of opinion that the compounded spirit . . . long recognized by the name of British brandy is entitled still to be so named and sold as 'British brandy.' . . .

"Our conclusion . . . is that the determination of the application of the term 'brandy' in this country can not be controlled by the nature of the apparatus or process used in the distillation of the spirit."

With regard to rum, "it has been suggested that the principal cause for the difference in flavor between rums produced in various places lies in the methods of fermentation used, rather than the processes of distillation. According to the evidence there are two distinct types of rum, Jamaica rum being representative of the first and Demerara rum of the second. The first type is the result of slow fermentation, lasting from 10 to 12 days, of wash set at a relatively high density; the second is the result of a rapid fermentation, lasting from 36 to 48 hours, of wash set at a low density.

"We see no reason, however, to deny the name of rum to either of these types. We consider that the definition of rum as 'a spirit distilled direct from sugar cane products in sugar cane growing countries', . . . fairly represents the nature of the spirit which a purchaser would expect to obtain when he asks for 'rum.' The Customs already recognize the distinction between 'rum', 'rum from Jamaica', and 'imitation rum', and we consider that this differentiation should be continued."

Geneva, gin, liqueurs, and other spirits were also taken account of by the commission.

With reference to compounded spirits, "we have been unable to recommend any restrictions upon the numerous materials used in the preparation of gin, Geneva, and other compounded spirits which are known to the British trade, or upon the processes which are employed in their manufacture. In the absence of information as to the nature of the materials employed we can express no opinion on the wholesomeness or otherwise of particular compounds, but we

received no evidence that any spirits of this nature (with the exception of absinthe) have a specially toxic action."

Bonding, labeling in bond, and questions concerned with trade in potable spirits under the British food and drugs acts are also considered.

Ale and lager beer, A. McGill (*Lab. Inland Rev. Dept. Canada Bul. 196, pp. 19*).—The author presents the results of the examination of 73 samples of ale and 67 samples of lager beer collected in Canada.

Of the goods sold as ale or beer, 2 samples contained "such small amounts of alcohol, as to exclude them from recognition as ale; they properly belong to the class of nonalcoholic beverages." Two other samples, sold as root beer and ginger beer, contained alcohol "equivalent to more than 4 per cent of proof spirit."

Chemical examination of pumpkin seed, F. B. Power and A. H. Salway (*Jour. Amer. Chem. Soc., 32 (1910), No. 3, pp. 346–360*).—Expressed oil, the "press-cake," and the shells were chemically studied and physiological tests were made of the fatty oil and resin of pumpkin seed, particularly with reference to the reputed value of pumpkin seed as a tæniafuge.

"As it is evident that these seeds contain no principle exhibiting marked physiological activity, any value which they may actually possess, when administered in substance for the purpose indicated, would therefore appear to be attributable to a mechanical action. In any case, the remedial value of pumpkin seeds can not be considered such as to justify their recognition by a national pharmacopœia."

Chemical examination of watermelon seed, F. B. Power and A. H. Salway (*Jour. Amer. Chem. Soc., 32 (1910), No. 3, pp. 360–374*).—The results are reported of an extended study of expressed oil, the "press-cake," and the shells of watermelon seed, together with the results of studies of their possible physiological effect.

According to the authors, "the seeds contain no alkaloid, and no evidence was obtained of the presence of a glucosid. . . .

"The resin, both from the kernels and the shells of the seed, was administered to a dog in amounts of 1 gm. each, but no obvious effect was produced, and it may therefore be considered quite innocuous."

Food preparations, M. Mansfield (*Jahresber. Untersuch. Anst. Nahr. u. Genussmtl. Allg. Österr. Apoth. Ver. Wien, 21 (1908–9), pp. 8, 9; abs. in Ztschr. Untersuch. Nahr. u. Genussmtl., 19 (1910), No. 5, p. 290*).—Data are given regarding the examination of a number of food materials including a zwieback for diabetics which was made of almonds only.

Food and drug analyses, R. E. Rose and B. H. Bridges (*Fla. Quart. Bul. Dept. Agr., 20 (1910), No. 1, pp. 106–142*).—According to the authors' summary, a total of 327 samples of foods and drugs was examined, of which 217 were classed as official samples. Of these, 8 were found to be adulterated and 42 misbranded. The samples examined included flavoring extracts, coffee, beer, wine, baking powders, condensed milk, olive oils, sirups, spices, and other similar materials, as well as drugs.

Report of the department of food and drugs, state board of health, for January, 1910, and inspectors' reports for the month of January, 1910, H. E. Barnard (*Mo. Bul. Ind. Bd. Health, 13 (1910), No. 1, pp. 3, 4*).—Of 142 samples of beverages, chocolate, butter, meat products and mince-meat, and other food materials, 94 were found to be legal. A number of drugs were also examined.

During the month of January, 918 dairies, stores, bakeries, hotels, and food manufacturing plants were inspected, of which the greater number were found to be in good or fair condition.

Tenth annual report on food adulteration under the pure food law, W. M. Allen and H. Hill (*Bul. N. C. Dept. Agr., 30 (1909), No. 12, pp. 88*).—A comprehensive account is given of the work carried on under the state pure food law during the year 1909. Out of a total of 721 samples which were examined, 154 were found to be adulterated, misbranded, or not properly labeled. The materials examined included among others meats, oysters, flour, milk, cream, condensed milk, ice cream and ice cream substitutes, table and cooking oils, canned fruits, vegetables, and similar goods, confectionery, and beers, imitation beers, and other beverages.

Information on food and drug inspection and investigation, R. M. Allen, J. O. LaBach, and L. A. Brown (*Kentucky Sta. Bul. 144, pp. 249–267*).—The bulletin furnishes information on a variety of topics with special reference to the Kentucky food and drug law, including the guaranty clause, the use of artificial color, bleached flour, watered oysters, old stock in grocery and drug stores, the use of the word "approximately," the labeling of products retailed from the original packages, a decision of the Bureau of Internal Revenue with respect to the purchase of alcoholic and other liquors for analysis under the food and drugs act, and general information regarding drug inspection.

Food inspection decision (*U. S. Dept. Agr., Food Insp. Decision 114, pp. 2*).—This decision has to do with the labeling of "Caracas cocoa."

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 165, pp. 5; 166–167, pp. 2 each; 168–169, pp. 3 each; 170, pp. 2; 175, pp. 2; 176, pp. 5; 177, pp. 2; 178, pp. 3; 180–185, pp. 2 each; 186–187, pp. 3 each; 188–192, pp. 2 each; 193, pp. 3; 194, pp. 6; 195–199, pp. 2; 200, pp. 7; 201, pp. 4; 202, pp. 5; 203, pp. 3; 204, pp. 2; 205, pp. 3; 207–210, 212–213, pp. 2 each*).—These notices of judgment have to do with the misbranding of canned peas, macaroni, vinegar, corn meal, canned cherries, coffee, a number of drugs, oil of lemon, rice, peaches and apricots, sirup, and preserves; the misbranding and adulteration of vinegar, custard, a beverage ("koca nola"), sirup, white wine vinegar, lemon extract, cider vinegar, powdered colocynth, and pepper; and the adulteration of confectionery ("silver dragees"), water, a drug, currants, cream, and ice cream.

Notice of judgment 165 contains a classified index of notices of judgment already issued.

Meat inspection, H. Martel (*L'Examen des Viandes. Paris, 1909, pp. 243, pls. 4, figs. 99*).—An introductory handbook on meat inspection which is designed, the author states, for the use of all who wish to judge understandingly of the quality of meat. The examination of animals on the hoof, slaughtering, the inspection of meat after slaughtering, frauds in meat products, especially considered from the standpoint of army supplies, and the principal types of meat unsuitable for food are among the subjects discussed.

[Food of Mexican country people], C. R. Enock (In *Mexico. New York and London, 1909, pp. 213–218, pl. 1*).—Data are summarized regarding the food and living conditions of the Mexican peons, country people who are largely engaged in agricultural pursuits and in mining. Corn meal, the native beans, fat, and meat when it can be obtained, are the principal articles of diet.

Penny luncheons, Alice C. Boughton (*Psych. Clin., 3 (1910), No. 8, pp. 228–231, fig. 1*).—The character of the penny luncheons served to school children in the thickly congested districts of Philadelphia by the Starr Centre Association (E. S. R., 22, p. 371) is described and the nutritive value of the foods and related topics discussed. The foods supplied are reasonably varied and marked differences are observed in the selections made by the children. For instance, the colored children show a marked preference for creamed hominy, while Jewish children quite generally select fruit and a wheat cereal food. That the luncheon system is appreciated is shown by the large patronage it receives.

Feeding of prisoners, D. WIDMER (*Umschau, 14 (1910), No. 6, pp. 109–111*).—The need for an adequate diet and the importance of variety are discussed, and information is given regarding the attempts made to secure satisfactory diet at Basel state prison. The list of menus for 9 days which is submitted shows that an attempt is made to avoid a regular rotation of menus. According to the author, the food cost between 10 and 11 cts. per person per day during 1908. According to Jacquet's calculations, the daily diet supplies 90 to 95 gm. protein, of which one-third is of animal origin; 60 to 65 gm. fat; and 500 to 525 gm. carbohydrates; the total energy value being 3,000 calories.

Nutrition and dietetics, W. S. HALL (*New York and London, 1910, pp. X+315, figs. 7*).—As the subtitle states, this volume is designed as a manual for students of medicine, for trained nurses, and for dietitians in hospitals and other institutions.

The pincipal subjects included are foods, the use of foods in the body, diet in health, and diet in disease. The appendixes give classifications of diets, recipes for preparing foods, and directions for the experimental study of the chemistry of foodstuffs, foods, and digestion.

The volume as a whole discusses the subject of nutrition in health and disease, particularly with reference to students' needs, and according to the author, represents the course in food and nutrition which he and his associates now give to undergraduates and nurses. An index is provided.

Human nutrition, II, FLORA ROSE (*Cornell Reading-Course for Farmers' Wives, n. ser. 2, 1909, No. 7, pp. 25–48, figs. 3*).—Undereating and overeating, the preparation of foods, vegetable cookery, and similar questions are taken up in this popular discussion of food problems. Simple menus are suggested and a plea is made for simplicity in living. For earlier work see a previous note (E. S. R., 21, p. 363).

A two-years' test of a vegetarian diet including animal fats, H. TISSIER (*Compt. Rend. Soc. Biol. [Paris], 68 (1910), No. 1, pp. 12–14*).—From the data discussed, the author concludes that in the case of 2 adults, one of 43 and the other of 53 years, a vegetarian diet was amply sufficient not only for the ordinary body demands but also for a large amount of physical exertion.

The nutritional origin and treatment of beriberi, L. BREAUDAT (*Bul. Soc. Path. Exot., 3 (1910), No. 1, pp. 13–20*).—From his experiments with animals and man the author does not recognize the existence of toxic properties in normal rice albumin. On the other hand, his results confirm, in his opinion, the theory that certain parts of the rice bran exercise a protective action in beriberi. He states that all of the animals experimented on, whether they were affected with parasites or not, when fed cooked polished rice infected with the vibrion ferment, died, while similar animals fed in a similar way, except that rice bran was given in addition, did not become diseased but rather gained in weight. Rice bran was also found to exercise curative properties.

The protective and curative properties were also demonstrated, according to the author, in studies with man.

The report is followed by a discussion.

Dried milk as a food for infants, C. K. MILLARD (*Brit. Med. Jour., 1910, No. 2561, pp. 253, 254*).—On the basis of extensive tests of dried milk at Leicester Corporation Infants' Milk Depot, conclusions favorable to the use of this material as infant food were reached. According to the author, the advantages attending its use are ease of digestion, bacterial purity including freedom from tubercle bacilli and contamination by flies, the fact that it may be kept in hot weather without souring, its cheapness as no waste is involved, and its convenience, and palability.

"Its disadvantages are of a theoretical nature, and consist in the presumed destruction of the antiscorbutic properties of fresh milk. This, however, can be compensated, if thought necessary, by administration of fruit juice. For domestic purposes apart from infant feeding, dried milk has distinct limitations as a substitute for fresh milk, as, owing to its taste, it is not so suitable for adding to tea or coffee."

The laws of digestion and resorption, S. ARRHENIUS (*Ztschr. Physiol. Chem., 63 (1909), No. 5, pp. 323–377, dgms. 3; Meddel. K. Vetensk. Akad. Nobelinst., 1 (1909), No. 14, pp. 31, dgm. 1*).—This mathematical discussion of the laws of digestion is based on the studies of digestion which have been reported by E. S. London.

Handbook of physiological methods—respiration and digestion, edited by R. TIGERSTEDT (*Handbuch der physiologischen Methodik—Atmung-Verdauung. Leipsic, 1908, vol. 2, pt. 2, pp. 188, figs. 36*).—This volume contains four papers, namely, Respiratory Movements, by F. Schenk; Methods of Studying Enzymic Reaction, by C. Oppenheimer; Movements of the Digestive Tract, by R. Magnus; and Operative Methods for the Study of the Digestive Glands, by I. P. Pawlow.

Bibliographies are provided and the volume as a whole, like the others in the same series, is designed as a handbook for laboratory use.

Handbook of physiological methods—muscle physiology, edited by R. TIGERSTEDT (*Handbuch der physiologischen Methodik—Muskelphysiologie. Leipsic, 1908, vol. 2, pt. 3, pp. 488, pls. 11, figs. 179*).—This volume contains four papers, namely, Methods for Studying the Thermodynamics of Muscles, by K. Bürker; Muscle Mechanics in General, by M. von Frey; Methods for Studying Special Forms of Muscular Movement, by O. Fischer; and Electro-Physiology, by S. Garten.

Bibliographies are provided, and, as with other volumes of the series, the sections constitute digests of available information on the subjects considered, with special reference to students' needs.

Treatise on physiology—heat, O. D. CHWOLSON (*Traité de Physique—l'Énergie Calorifique. Paris, 1909, vol. 3, pt. 1, pp. VII+408, figs. 126*).—In this exhaustive study of the question of heat from the standpoint of body energetics the author discusses thermochemistry, the variations in the size and pressure of bodies as a function of temperature, the heat capacity, the transformation of forms of energy into heat, thermochemical phenomena, cooling of bodies, and heat conductivity.

The different sections are provided with bibliographies and the volume as a whole is a handbook on thermochemistry and related topics.

Concerning the problem of protein metabolism, K. ROTHENSTEIN (*Beitrag zum Problem des Eiweiss-Stoffwechsels. Inaug. Diss., Univ. Bern, 1909, pp. 19*).—Experiments are reported on the income and outgo of nitrogen, dogs being used as subjects.

The utilization of proteid cleavage products in the animal body. XI, Experiments with man, E. ABDERHALDEN, F. FRANK, and A. SCHITTENHELM (*Ztschr. Physiol. Chem., 63 (1909), No. 2–3, pp. 215–221*).—According to the experimental data reported, the authors were able not only to prevent the loss of nitrogen but also to induce nitrogen gains in a 15-day period in which the final cleavage products of meat were given very largely per rectum.

The cleavage of nucleic acid taken in the food in the case of normal man, F. FRANK and A. SCHITTENHELM (*Ztschr. Physiol. Chem., 63 (1909), No. 4, pp. 269–282*).—From their investigations the authors conclude that it is not necessary to prolong an experiment more than a day after the close of the feeding

period, as the end products of nucleic acid metabolism are promptly recovered in the urine and feces. An important difference was observed in the case of man and animals with respect to the cleavage of purin bases, since in man the greater portion is found in the urea and other uric acid constituents of the urine and only a very small portion is recovered as purin bases. The investigations led to the conclusion that in the case of man uric acid is no more to be regarded as a metabolic product than it is in the case of animals, but that it is used as a building product.

The elimination of total nitrogen, urea, and ammonia following the administration of some amino acids, glycylglycin and glycylglycin anhydrid, P. A. LEVENE and G. M. MEYER (*Amer. Jour. Physiol., 25 (1909), No. 4, pp. 214–230*).—Gelatin was one of the materials included in these experiments which were made with dogs as subjects.

According to the authors, all of the excessive nitrogen added as gelatin to a standard diet "is eliminated in the form of urea. Thus, this experiment leads to the conclusion that either diketopiperazins do not enter into the composition of the protein molecule, or that the anhydrids of peptids within the protein molecule offer less resistance than when in a free state."

Effects of the presence of carbohydrates upon the artificial digestion of casein, N. E. GOLDTHWAITE (*Jour. Biol. Chem., 7 (1910), No. 2, pp. 69–81*).—According to the author, the experimental data recorded show that each of the carbohydates tested (glucose, maltose, dextrose, dextrin, and galactose) retarded the digestion of casein, the retardation being proportional to the amount of added carbohydrate.

On the occurrence of lipase in human tissues and its variation in disease, M. C. WINTERNITZ and C. R. MELOY (*Jour. Med. Research, 22 (1910), No. 1, pp. 107–128*).—Some of the conclusions drawn from this extended series of investigations are quoted below. Many of the other deductions have to do with pathological conditions.

"In general the nearer the organ approaches the normal histologically, in our series, the greater is its lipolytic action.

"There is apparently no decrease in the lipolytic activity in old age.

"The lipolytic activity of the various tissues at birth is very low, but it increases with extreme rapidity during the first few days of life. . . .

"There is no relation between the acidity produced by the action of the lipase on the tissue extract and the amount of hydrolysis of ethyl butyrate by the same extract."

Gastric lipase in newborn infants, J. IBRAHIM and T. KOPÉC (*Ztschr. Biol., 53 (1909), No. 5–6, pp. 201–217*).—According to the author, a lipase can be obtained from the mucous membrane of the stomach of new-born infants and feti in the last months.

Experiments on the resorption of fat in the small intestine, W. CRONER (*Biochem. Ztschr., 23 (1909), No. 1–2, pp. 97–136*).—From extended investigations the author concludes that variations of the small intestine differ qualitatively and quantitatively with reference to fat resorption. Soaps are resorbed only in the lower portion while emulsified neutral fats are resorbed throughout the small intestine, though more abundantly in the lower portion. The amount of fatty acid present has an effect on the amount of fat resorbed.

Concerning the physiology of water and salt, O. COHNHEIM, KREGLINGER, and KREGLINGER (*Ztschr. Physiol. Chem., 63 (1909), No. 6, pp. 413–431*).—From a study of conditions at high altitude, the authors conclude that an increase in hemoglobin concentration of the blood is not certain at an altitude of 3,000 to 4,560 meters. Severe muscular work caused a dilution of the blood, and profuse perspiration a lowering of the chlorin content of the body, which was followed

by a marked retention of chlorin in succeeding days. The lowering of the chlorin content, according to the authors, is attributable to a disturbance in the hydrochloric acid secretion in the stomach.

Chemical constitution and physiological activity of alcohols and acids, II, J. LOEB (*Biochem. Ztschr., 23 (1909), No. 1–2, pp. 39–96*).—In the case of organic acids the author concludes that physiological activity increases with an increased number of carbon atoms in the molecule but that the increased activity is relatively unimportant.

The fate of sodium benzoate in the human organism, H. D. DAKIN (*Jour. Biol. Chem., 7 (1910), No. 2, pp. 103–108*).—According to the author's summary of his investigations, "benzoic acid taken by men in doses of 5 to 10 gm. per day for 2 or 3 days, in the form of sodium benzoate, undergoes a practically complete conversion into hippuric acid and is eliminated as such in the urine. Under these conditions no free benzoic acid is excreted. There is no evidence of the conversion of benzoic acid into any aromatic oxy-acid; neither is there any evidence of any material part of the benzoic acid undergoing complete combustion in the animal body. With the doses of benzoic acid mentioned the increase in glycuronic acid derivatives in the urine is trifling."

An improved method for the estimation of hippuric acid is described.

Energy relations and human physiology, W. CAMERER (*Jahrb. Kinderheilk., 70 (1909), No. 4, pp. 391–440*).—Continuing his digest of data on this subject (E. S. R., 19, p. 768), the author presents controversial and critical data together with a summary of recently published material.

The production of animal heat and the substituting value of nutrients, G. WEISS (*Rev. Gén. Sci., 21 (1910), No. 1 pp. 19–26*).—A discussion of foods from the standpoint of energetics, based on Rubner's investigations.

Concerning fatigue induced by rapid movements, A. IMBERT (*Compt. Rend. Acad. Sci. [Paris], 149 (1909), No. 17, pp. 689, 690*).—From the results of his experimental studies the author concludes that rapid movements which do not produce an appreciable quantity of external muscular work quickly induce fatigue, which in certain subjects at least is very pronounced.

ANIMAL PRODUCTION.

Specific effects of rations on the development of swine, E. B. FORBES (*Ohio Sta. Bul. 213, pp. 239–305; Missouri Sta. Bul. 81, pp. 3–69*).—Three experiments in feeding swine at the Missouri Station during 1905 and 1906 are reported, in which the importance of phosphorus and other ash constituents in rations for growing animals was studied.

In the first experiment wheat middlings, linseed meal, soy beans, tankage, and germ oil meal were compared as supplements to corn in the dry lot for fattening hogs for market. Thirteen lots of 5 grade Poland-Chinas each were used. Analyses of the feeds are given, including the percentages of phosphorus and lecithin. The results included the increased weight of leaf lard, kidney, lung, heart, liver, spleen, tenderloin, and the chemical analyses of tenderloin muscles and meat of the cross-sections of the cuts.

"Where hogs were full-fed on these rations, the middlings ration was 23 per cent more efficient than corn alone, the linseed meal ration 32 per cent, the soy bean ration 38.5 per cent, the tankage ration 32.6 per cent, and the germ oil meal ration 17.6 per cent more efficient to cause gain in weight.

"Where these six rations were fed in practically equal but somewhat restricted amounts, the middlings ration was 28.9 per cent more efficient than corn alone, the linseed meal ration 29.8 per cent, the soy bean ration 22.6 per

cent, the tankage ration 18.1 per cent, and the germ oil meal ration 16.4 per cent more efficient than corn by itself. . . .

"The character of the increase produced by these rations was quite different. The tendency of five of these rations to cause growth of muscle and of internal organs was in the following order: Wheat middlings, linseed oil meal, soy beans, tankage, and corn alone. This was practically in accord with the phosphorus content of the rations; the tankage ration, however, failed to make growth in accord with its phosphorus content, probably because of the fact that its phosphorus was present mostly as bone. . . .

"The most striking peculiarity of the linseed meal ration is the high proportion of ash to protein in the meat produced by this feed.

"The germ oil meal ration occupied the opposite extreme from the linseed meal ration as regards the ash content of the tenderloin muscles, the percentage being lower than with any other lots.

"With hogs fed on corn alone the bones, muscles, liver, kidneys, lungs, heart and spleen all compose an abnormally small proportion of the increase in weight, and fat composes an abnormally large part of the increase.

"The muscles of corn-fed pigs are high in fat and low in protein and in water, but the percentage of water in the fat-free meat is decidedly high. The proportion of ash to protein in the flesh of corn-fed pigs, however, is not low.

"The livers of corn-fed hogs are small and low in ash and in phosphorus.

"Compared with rations containing more protein, corn produces small, fat kidneys. The low-proteid corn ration makes less extensive requirements, and so produces less development of the kidneys than other rations containing more protein. This has a bearing on the feeding of growing animals. The eliminative functions of the body will not reach full development if the animal be reared on a minimum protein allowance."

In the second and third experiments a study was made of the balance between the inorganic acids and bases in the rations fed. The elements considered were calcium, magnesium, potassium, sodium, sulphur, phosphorus, and chlorin. The rations consisted of corn alone; hominy, blood flour and bran extract; hominy, blood flour and lecithin; hominy, blood flour and bone meal; and hominy, blood flour and sodium phosphate. In all of the rations there was an excess of mineral acid over mineral base, this excess being somewhat lower in the bone meal lot than in the others and considerably greater in corn than in the mixed ration. The corn ration besides having the most acid ash had the least calcium, sodium, chlorin, and sulphur, and the most magnesium, potassium, and phosphorus, and the smallest proportion of proteid to nonproteid organic nutrients.

The hogs used weighed about 125 lbs. each and were mostly grade Poland-Chinas, 6 months of age.

"The excess of magnesium in proportion to calcium in foods appears to cause a counteractive liberation of calcium from the tissues, especially the bones, and thus we may produce malnutrition of the bones merely by the excessive use of a food characterized by disproportionate amounts of magnesium and calcium.

"The ash of the bran extract used in these experiments was, as is the ash of bran, about neutral. Hence this removal of ash from the bones was not acidosis, though the effects upon the bones was the same. Water extract of wheat bran is a very palatable food. Its nutritive value was most pronounced when used in moderation; the pathological consequences appeared when fed in larger amounts.

"'Bran disease,' 'shorts disease,' or 'miller's horse rickets' appears to be caused, in part, by the excessive proportion of magnesium to calcium in wheat bran and shorts."

The feeding of bran extract produced muscles low in phosphorus, liver high in phosphorus, and kidneys low in fat and ash but high in water. The ration containing lecithin appeared palatable, excelled in the rapidity and the economy of the gain produced, and the muscles, livers, and kidneys all contained a high percentage of phosphorus. The phosphorus of bone meal did not appear to add to the muscle-producing capacity of a low phosphorus ration; in fact, there was some evidence to suggest that it interfered to a slight extent with the utilization of protein.

"The muscles of the pigs which received bone meal were lower in ash, and percentage of phosphorus in the ash, than the muscles of pigs which had received a low-phosphorus ration lacking the bone meal.

"A ration which was very low in phosphorus, potassium, and calcium, but which contained an abundance of protein and other organic nutrients, made very little increase in muscles and in bone ash.

"The ration lowest in phosphorus produced muscles which were especially low in water, both in the whole tissues and in the fat-free substance; high in protein, ash, and phosphorus, but low in the proportion of phosphorus to protein. . . .

"The phosphorus compounds of the food do not directly favor fattening, as they do muscular growth, but they may do so indirectly, through affecting the general health of the animal. On the other hand, they are apt to discourage fattening in growing animals through making possible the normal use of the nutriment in the formation of proteid increase."

First report of comparative experiments with swine from different breeding centers, N. O. H. Bang, N. Beck, and P. Gommesen (*Ber. K. Vet. og Landbohöjskoles Lab. Landökonom. Forsög [Copenhagen], 67 (1910), pp. 86, figs. 5*).—The experiments here reported were conducted at two Danish estates, Elsesminde and Rodstenseje, during 1907 and 1908 for the purpose of discovering certain families of swine or single individuals within such families which may be supposed to satisfy in a marked degree present demands of producton and market both through inner qualities (exceptional health and vigor) and exterior conformation (high slaughter value), and which may therefore safely be used as foundation stock for the swine husbandry of the future.

Average data obtained at slaughtering time for 88 Yorkshires and 363 swine of the native Danish breeds of Funen and Jutland swine breeding centers are presented in detail. While the average amount of feed eaten and gains made by the different breeds did not vary greatly in either experiment, the Yorkshire swine proved superior to the Danish breeds for market purposes, especially in point of firmness of pork, form and fullness of belly, form and size of ham, fineness of head, bone and skin, as well as "general impression," the total number of points awarded being (on a scale of 15) 13.1 for Yorkshires and 11.9 for Danish swine in the first series of experiments, and in the second series, 12.6 and 11.7, respectively. Better results were obtained with sows than with barrows in the case of both breeds. Illustrated descriptions of the modern hog houses in which the experiments were conducted are included in the report.

The new hog barn, J. A. Craig and W. A. Linklater (*Oklahoma Sta. Rpt. 1909, pp. 37–40, figs. 2*).—This is a description of a hog barn built purely for experimental purposes. The ground plan and photographs of the exterior are also given.

Calf feeding experiments, HITTCHER (*Landw. Jahrb., 38 (1909), No. 5–6, pp. 871–950; abs. in Milchw. Zentbl., 6 (1910), No. 2, pp. 68–75*).—In an experiment planned to study the efficacy of disastasolin 37 calves between 7 and 8 days of age were used, but only 14 completed the full feeding period of 15 weeks. The calves were gradually changed from whole milk to skim milk pasteurized at 90°, then cooled to 65° C., to which had been added 50 gm. of starch, 2 gm. of powdered chalk, 1 gm. of salt, and 10 cc. of a 1 per cent solution of formalin for each liter of milk. This ration was fed in the proportion of 2.2 kg. dry matter to 100 kg. live weight. In the group of calves fed the ration without the addition of diastasolin the average daily gain per head was 0.6921 kg., at a cost of 60.41 pfennigs (about 15.1 cts.) per kilogram. The other group made an average daily gain of 0.7109 kg., at a cost of 64.97 pfennigs (about 16.24 cts.) per kilogram.

In a comparison of cooked and raw whole milk, the best gains were made with the raw milk during the first 5 weeks and with cooked milk the second 5 weeks, but throughout the whole period of 10 weeks there was but very little difference. Powdered chalk was added to the milk of both groups.

The average daily gains per head made by calves in 10 weeks, fed on cooked and raw milk with various mineral supplements, were as follows: On cooked milk and tricalcium phosphate, 774 gm.; cooked milk and bicalcium phosphate, 687 gm.; cooked milk and monocalcium phosphate, 675 gm.; cooked milk and calcium citrate, 697 gm.; cooked milk and calcium chlorid, 644 gm.; cooked milk and salt, 803 gm.; raw milk and salt, 866 gm.; cooked milk and chalk, 876 gm.; raw milk and chalk, 863 gm.; cooked milk without mineral supplement, 790 gm.; raw milk without mineral supplement, 798.5 gm.; and raw milk with formalin, 702 gm.

The improvement of cattle in the Upper Palatinate, O. GUTH (*Wurden die Interessen der Landwirtschaft in der Nördlichen Oberpfalz dadurch, dass man die Öffentliche Förderung der Viehzucht auf einen Landschlag Konzentrierte, irgendwie Vernachlassigt oder Geschadigt? Inaug. Diss., Univ. Bern, 1909, pp. 59*).—A comparative study of the cattle breeds in Bavaria, with special reference to the value of the Voightlander, or red breed, of central Germany. Measurements of many animals made at different ages are given.

The sterility of cattle, E. HESS (*Schweiz. Arch. Tierheilk., 48 (1906), No. 6, pp. 351–441; Separate, 1908, pp. 93*).—A summary of information on the causes and treatment of abnormal conditions in cows which are directly or indirectly the causes of sterility, with numerous references to the literature on the subject.

Feeding experiments with sheep, A. LALIM (*Norsk Landmandsblad, 29 (1910), Nos. 2, pp. 17–20; 3, pp. 36–41*).—Experiments were conducted at 5 different Norwegian farms for the purpose of determining how much hay mature sheep require for the maintenance of body weight during the winter months when they receive hay and water only.

It was found that sheep weighing between 50 and 70 kg. at the beginning of the trials were able to maintain their weight on a daily ration of from 1.01 to 1.46 kg. of hay per head. Analyses of the hay fed showed that these amounts contained from 0.90 to 1.31 kg. dry matter, 0.07 to 0.15 kg. protein, 0.02 to 0.03 kg. fat, 0.47 to 0.67 kg. nitrogen-free extract, and 0.24 to 0.47 kg. fiber.

Goat raising in Norway, 1660–1814, S. SKAPPEL (*Tidsskr. Norske Landbr., 16 (1909), No. 4, pp. 167–173*).—A historical sketch.

Memorandum on horse breeding (*Dept. Agr. and Tech. Instr. Ireland Jour., 10 (1910), No. 2, pp. 231–240*).—This is an account of the horse breeding work of the department of agriculture for Ireland.

During the 9 years in which this has been in operation several changes have been made, the most important of which is the recognition of the half-bred sire of the hunter or Irish draft type. Other changes include the purchase and resale of thoroughbred stallions and the restriction of cart horse stallions to specified districts. A new policy is outlined to prevent the use of stallions suspected of inheritable diseases. Information regarding legislation of continental Europe for the control of live stock breeding is also given.

Horse raising in Denmark in 1908, J. Jensen (*Tidsskr. Landökonomi, 1909, No. 7, pp. 405–420*).—The article gives the usual annual survey of the industry.

Report of the chief poultry expert, D. D. Hyde (*New Zeal. Dept. Agr. Ann. Rpt., 17 (1909), pp. 138–163, pls. 3*).—This is the usual annual report of the poultry industry of New Zealand. An experiment is reported as to the cost of rearing chicks 5 months of age, in which the average cost per bird for that length of time was 1s. 11½d. The average weight of food consumed per bird was 27 lbs. The use of the open-air system of housing proved satisfactory. There is a discussion of the causes of mortality of chicks during incubation, and other related matters.

The selection and feeding of laying hens, A. G. Philips (*Kansas Sta. Bul. 164, pp. 277–291, figs. 4*).—This bulletin contains advice on the selection of laying hens and methods of feeding for egg production. Two styles of feed hoppers are illustrated and described.

A triple-yolked egg, R. Pearl (*Zool. Anz., 35 (1910), No. 14–15, pp. 417–423, figs. 2*).—This is a description of an egg laid by a Barred Plymouth Rock pullet and containing 3 yolks. Each of the yolks was of normal size, possessed a germinal disc, and was enclosed in a separate yolk membrane. The yolks were in no way fastened together and there was no trace of a chalaza. The shell membranes were normal.

Hens that feed themselves, A. F. Hunter (*Rural New Yorker, 69 (1910), No. 4039, pp. 377, 378, fig. 1*).—The author reports successful results from feeding a dry mash, with the special claim that the labor for caring for the fowls is reduced nearly one-half without decreasing the egg yield.

Electric incubators and brooders, F. E. Ward (*Sci. Amer., 102 (1910), No. 10, pp. 204, 205, figs. 5*).—Details are given for constructing an inexpensive homemade electrically heated incubator holding 50 eggs, and for making two styles of electrically heated brooders.

Animal husbandry in Denmark, 1908, with special reference to cattle raising and dairy husbandry, A. Appel (*Tidsskr. Landökonomi, 1909, No. 7, pp. 337–404; Mælkeritid., 23 (1910), No. 3, pp. 51–67*).—A general review.

Live stock guaranties in Switzerland, H. Woker (*Die Gewährleistung für Mängel und Zugesicherte Eigenschaften beim Schweizerischen Viehandel. Inaug. Diss., Univ. Bern, 1909, pp. 146*).—This contains a history of the methods of warranty which have been practiced in the Swiss live stock trade. Suggestions are offered for their improvement and unification that would be more advantageous to both buyer and seller.

Number of animals slaughtered and total receipts during fiscal year 1909 (*U. S. Senate, 61. Cong., 2. Session, Doc. 428, pp. 27*).—Statistics showing the number of animals slaughtered during the fiscal year 1909 at the establishments in the United States operating under federal inspection are presented.

Composition of forage in highland prairies and mountain pastures, C. Dusserre (*Ann. Agr. Suisse, 11 (1910), No. 1, pp. 5–8*).—Analyses of pasture grasses taken at different altitudes in the Alps are reported. The range of the different constituents is as follows: Protein from 9.7 to 15.1 per cent, fat from 2.9 to 6.8 per cent, and carbohydrates from 36.9 to 47.6 per cent.

Analyses of roots, B. C. ASTON (*New Zeal. Dept. Agr. Ann. Rpt., 17 (1909), pp. 486–497*).—Analyses are reported of a number of varieties of beets and turnips.

Analyses of feeding stuffs, F. W. MORSE and B. E. CURRY (*New Hampshire Sta. Bul. 147, pp. 167–186*).—This bulletin contains the text of the state feeding stuff law and of a proposed amendment thereto, a report of a meeting of state feeding stuffs officials and manufacturers with reference to a uniform feeding stuffs law, a report of the work in New Hampshire in the inspection of feeding stuffs, including analyses of cotton-seed meal, gluten feed, molasses feed, calf meal, meat meal, beef scraps, chicken feed, and many mixed feeds.

[Analyses of feeding stuffs], R. O. BAIRD (*Oklahoma Sta. Rpt. 1909, pp. 29–31*).—Analyses are reported of wheat bran and shorts, corn chops, Kafir corn, hominy, cotton-seed meal, hulls and cake, Bermuda hay, prairie hay, alfalfa, and mixed feeding stuffs.

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 171–173, pp. 2 each; 174, 179, pp. 3 each; 206, 211, 214, pp. 2 each*).—These notices relate to the misbranding of stock feeds, the adulteration of milk, and the adulteration and misbranding of stock feeds, cotton-seed feed meal, and milk flour.

[Essays in heredity and development of the animal organism] (In *Darwin and Modern Science. Cambridge, 1909, pp. 85–101, 102–111, 171–184, 185–199, 247–270*).—The following essays, written in commemoration of the centenary of the birth of Charles Darwin and of the fiftieth anniversary of the publication of The Origin of Species, are of interest to animal breeders as they summarize the progress made in the study of heredity since the time of Darwin: Heredity and Variation in Modern Lights, by W. Bateson; The Minute Structure of Cells in Relation to Heredity, by E. Strasburger; The Influence of Darwin on the Study of Animal Embryology, by A. Sedgwick; the Palaeontological Record, I, Animals, by W. B. Scott; and Experimental Study of the Influence of Environment on Animals, by J. Loeb.

Fifty years of Darwinism (*New York, 1909, pp. V+274, pls. 5, fig. 1*).—This book consists of centennial addresses in honor of Charles Darwin before the American Association for the Advancement of Science, Baltimore, January, 1909. The following essays are of special interest to students of animal heredity: The Cell in Relation to Heredity and Evolution, by E. B. Wilson; The Behavior of Unit Characters in Heredity, by W. E. Castle; Mutation, by C. B. Davenport; Adaptation, by C. H. Eigenmann; and Darwin and Paleontology, by H. F. Osborn.

The cell as the unit of life, A. MACFADYEN, edited by R. T. HEWLETT (*London, 1908, pp. XVI+381, pl. 1, figs. 14*).—These lectures, delivered at the Royal Institution, London, 1899–1902, serve as an introduction to biology. They contain a summary of information on the chemistry of the living cell, with special reference to the action of cellular enzyms and toxins in the work of digestion, assimilation, and immunity to disease.

On the homologies and significance of the internal glands of the ovary, P. BOUIN and P. ANCEL (*Compt. Rend. Soc. Biol. [Paris], 67 (1909), No. 31, pp. 464–466*).—The authors find that in man, primates, dog, horse, cow, pig, and other mammals with spontaneous ovulation there are 2 kinds of corpus luteum. There is no interstitial gland, but its place is supplied by the periodic corpus luteum. In the rabbit, guinea pig, mouse, cat, and other mammals with nonspontaneous ovulation the interstitial gland is present and only one corpus luteum.

Concerning the relation between the outer and inner chest measurements and the organs lying in the thoracic cavity, M. MÜLLER (*Landw. Jahrb., 38*

(1909), No. 4, pp. 593–627, pl. 1, figs. 4).—A discussion of data in an article previously reported (E. S. R., 21, p. 268).

The author points out the inaccuracies which result from estimating the volume of the thoracic cavity either by taking the inner length and breadth or by outer measurements. The volume of the lungs is diminished if a layer of fat is deposited on the inner walls of the cavity, and the lung weight can not be estimated from the volume as it varies so much in specific gravity. It is stated that the length of the sternum does not vary so much between light and heavy horses as other observers have thought.

The position of the shoulder blade and its influence on the posture and movements of the horse, Möller (*Landw. Jahrb., 38 (1909), No. 4, pp. 697–713, figs. 10*).—A discussion of the statics and mechanics of the fore limb, with special reference to conclusions reached by Müller (E. S. R., 21, p. 268). By means of diagrams the author illustrates his conclusion that a more oblique and longer shoulder blade may be allowed in a saddle horse ridden for comfort than when speed or the capacity to draw heavy loads is the desideratum.

Regeneration of the beak in the goose (Anser cinereus) and the duck (Anas boschas), E. I. Werber and W. Goldschmidt (*Arch. Entwickl. Mech. Organ., 28 (1909), No. 4, pp. 661–677, fig. 1*).—The authors found that it took from 4 to 6 weeks for the regeneration of the new beak when from 4 to 10 mm. in length was amputated from the beak of ducks and geese which were about 3 weeks of age.

DAIRY FARMING—DAIRYING.

Studies on the history, present condition, and future of cattle breeding in Holland, D. L. Bakker (*Studien über die Geschichte, den Heutigen Zustand und die Zukunft des Rindes und seiner Zucht in den Niederlanden mit Besonderer Kritischer Berücksichtigung der Arbeitsweise des Niederländischen Rindviehstammbuches. Inaug. Diss., Univ. Bern, 1909, pp. 138+6, pls. 20, charts 2*).—This is a history of cattle breeding in Holland from the earliest times.

According to the author, the original cattle of Holland were of the *Bos taurus brachyceros* type and were red in color. The black color came from Jutland cattle imported in the latter part of the eighteenth century. A study of the cattle in different districts at the present time shows 3 main types.

There is an account of the work of the breeders' association and measures taken by the government to encourage cattle breeding, and an improved and more uniform method of judging type according to the pedigrees of animals is outlined. Measurements of cattle are given and also the report of an investigation as to the value of the "milk mirror" as an indication of milking capacity. The results are summarized in the following table, which shows that a good milk mirror was not necessarily associated with the largest yields of milk:

Average daily milk yield, percentage of fat in milk, and character of the milk mirror in Dutch cattle.

Number of cows.	Character of milk mirror.	Average daily yield of milk.	Fat content.
		Kg.	*Per cent.*
37	Excellent	15.90	3.17
47	Good	15.89	3.23
39	Fair	16.23	3.19
31	Poor	16.42	3.14

A study of the dairy buffalo of Roumania, G. DIACONU (*Arhiva Vet., 6 (1909), Nos. 2, pp. 92–105; 3–4, pp. 181–192; 5, pp. 301–326, pls. 8*).—These papers include a short historical sketch of the domesticated buffalo of Europe, descriptions and measurements of 2 types of dairy buffaloes bred in Roumania, the characteristics of a good dairy buffalo cow, yields of milk, percentages of fat, lactose and other constituents of buffalo milk, and other general information on this subject.

Investigations on the effect of diminishing the amount of coarse feeds in rations for dairy cows, T. MÜLLER (*Ber. Physiol. Lab. u. Vers. Anst. Landw. Inst. Halle, 1909, No. 19, pp. 43–125*).—During 6 feeding periods lasting about 24 days each 2 dairy cows were fed a basal ration of beets, cotton-seed meal, peanut meal, malt sprouts, and ground barley. In the first and fifth periods rye straw was fed at the rate of 10 kg. per day per 1,000 lbs. live weight. In the second period the amount of straw was reduced to one-half, and in the third period to one-fourth that of the first period. No straw or other roughage was fed in the fourth period. When the straw ration was reduced the loss in digestible nutrients was equalized by increasing the ration of ground barley.

The reduction in amount, and even the total elimination of the rye straw ration, produced no marked change in the amount or composition of the milk. The cows at first appeared to be unsatisfied but gradually became more accustomed to the less bulky ration. On substituting meadow hay for the straw in the sixth period there was an increased yield of milk and at a reduced cost. The average cost of milk per kilogram in the first and fifth periods was 7.2 marks (about 1.6 cts. per quart); in the second and third periods, 7.5 marks; in the fourth period, 7.7 marks; and in the sixth period, 6.2 marks.

The author draws the conclusion that the ration of coarse fodder may be reduced, or even eliminated for a short period, without detriment to the health of the animal and without reducing appreciably the amount of milk, although increasing its cost.

Specific gravity of Danish milk, H. M. HOYBERG (*Mælkeritid., 23 (1910), No. 1, pp. 15–20*).—Examinations of the specific gravity of 1,000 samples of mixed milk from Danish herds, collected during the months from March to June and August, were made by means of a Bischoff areometer (lactometer). About 210 cc. of milk is required with this instrument, with a cylinder 33 cm. high and 4 cm. internal diameter.

In specific gravity the samples averaged 1.0324; 0.3 per cent of them were from 1.029 to 1.030; 1.1 per cent from 1.030 to 1.031; 12 per cent from 1.031 to 1.032; 56 per cent from 1.032 to 1.033; 28 per cent from 1.033 to 1.034; and 2.4 per cent from 1.034 to 1.035. The author recommends that the Bischoff lactometer be made the standard for the whole country, and that the legal standard for the specific gravity of new mixed milk be placed at from 1.0310 to 1.0340.

Analysis of the cleavage products of the nucleoprotein of the mammary glands, J. A. MANDEL (*Proc. Soc. Expt. Biol. and Med., 7 (1909), No. 2, pp. 24–26*).—The author finds a close correspondence between casein and the nucleoprotein of the cells in the mammary gland, which he thinks is strong proof that the casein of the milk is formed by a breaking down of the nucleoprotein of the protoplasm, with a setting free of the carbohydrates and the purin and pyrimidin bases.

Are the colostrum bodies a reliable test for determining whether or not the milk was obtained from a new milch cow? L. ANDERS (*Hat der Nachweis der Kolostrumkörperchen eine Bedeutung für die Forensische Beurteilung des Frischmilchendseins der Kühe? Inaug. Diss., Univ. Bern, 1909, pp. 40*).—This has been noted from another source (E. S. R., 21, p. 675).

A new lactic-acid producing Streptothrix, found in the fermented milk of India, called the dadhi, G. C. CHATTERJEE (*Centbl. Bakt.* [*etc.*], *1. Abt., Orig., 53* (*1910*), *No. 2, pp. 103–112, fig. 1*).—The author found that the coagulation of dadhi, the fermented milk of India, which is similar to yoghourt and leben, was due to a Streptothrix having characters similar to the bacteria found in the other fermented milks, but differing from them by showing peculiar pink granules when stained with methylene blue and by forming convoluted chains in glucose agar.

Obligate anaerobic bacteria in milk and dairy products, C. BARTHEL (*K. Landtbr. Akad. Handl. och Tidskr., 49* (*1910*), *No. 1, pp. 15–66*).—The investigations of the author lead him to conclude that obligate anaerobic bacteria occur but very rarely in common market milk. Those that are found are almost wholly of two species, Schattenfroh and Grassberger's nonmotile butyric-acid bacterium and *Bacterium putrificus* (Bienstock). During the fall and winter months the former occurs much more frequently than the latter, while the opposite holds true during the spring and early summer. The obligate anaerobes are considerably more numerous during the summer months than in the fall or winter, as are also the total bacteria of the milk. No direct relation was found between the general hygienic condition of the milk and the appearance therein of obligate anaerobic bacteria. The author furthermore concludes that *B. putrificus* (Bienstock) and *Paraplectrum fœtidum* (Weigmann) are identical.

A contribution to the question of the infectiousness of the milk of tuberculous cows, G. HESSLER (*Ein Beitrag zur Frage der Infektiosität der Milch Tuberkulöser Kühe. Inaug. Diss., Univ. Bern, 1909, pp. 64, charts 2*).—The object of this investigation was to determine whether or not the milk of cows reacting to tuberculin but not showing other clinical evidences of tuberculosis contained tubercle bacilli. Sixty-one cows belonging to 3 different herds were tested.

The chief source of tubercle bacilli in the milk was found to be from tuberculous udders. In a few cases only they were found in the milk of cows showing clinical evidence of the disease when the udder was not affected. They were not found in cows reacting to tuberculin but otherwise affording no clinical evidence of tuberculosis. In some cases milk became infected from particles of litter which dropped from the exterior of the udder into the milk pail.

The conclusion is reached that an occasional clinical examination of the herd and care in preventing infection from the milk from diseased sources will enable dairymen to furnish a milk supply free from tubercle bacilli.

A bibliography is appended.

On pasteurizing milk and on the thermal death point of tubercle bacilli in naturally infected milk, Y. VAN DER SLUIS (*Ueber die Abtötung der Tuberkelbacillen in Natürlich Infizierter Milch und über die Pasteurisierung der Milch. Inaug. Diss., Univ. Bern, 1909, pp. 24*).—No tubercle bacilli were found in the milk of cows in which the tuberculosis was localized in one particular organ, but in generalized tuberculosis and in tuberculosis of the udder they were present in all cases but one. Intra-uterine infection of the young did not take place in pregnant guinea pigs inoculated with the bacilli. A temperature of 80° C. was found to be necessary to insure the destruction of all the bacilli in naturally infected milk. Artificial cultures of bacilli in a medium containing milk acquired an ability to withstand slightly higher temperatures than those normally present in milk.

Report of the operations of the Danish pasteurization law during 1908–9 (*Mælkeritid, 22* (*1909*), *No. 52, pp. 1156–1171*).—During the year 1,391 cream-

eries were under control relative to the pasteurization of milk and buttermilk used for feeding purposes and of cream used in the manufacture of export butter, of which 1,182 were cooperative and 164 proprietary creameries, and 45 estate dairies. The police authorities have taken 14,165 control samples in all, about one-half of which were of skim milk and 5,665 of buttermilk. The percentages of the samples of skim milk, buttermilk, and cream found insufficiently heated were 4.3, 2.2, and 2.9 per cent, respectively. During the year 74 per cent of the total number of creameries complied fully with the provisions of the law, 21 per cent violated it once, as a general rule through inadvertence, and 5 per cent violated it two or more times. Fines were imposed for 270 violations in all, to the amount of 5,713 kroner ($1,540).

Report of the milk commission, 1909, A. R. Pyne et al. (*Toronto: Govt., 1910, pp. 142, figs. 26*).—This contains reports of inquiries into the production, care, and distribution of milk, a résumé of the milk laws of the Canadian provinces and the United States, a report of conditions found on dairy farms, and an account of the efforts of cities in the United States to secure a clean milk supply.

The dairy industry in Texas, C. H. Alvord (*Texas Dept. Agr. Bul. 11, pp. 105, figs. 65*).—An account of the present condition of the dairy industry in Texas, together with information on all phases of the subject, prepared specially for the practical man who wishes to engage in dairying in that State.

Dairying in France, G. Ellbrecht (*Mælkeritid., 22 (1909), No. 50, pp. 1085–1108, figs. 10*).—This article gives a description of the industry, especially of the manufacture of Roquefort, Cantal, and Laguinole cheese, and of Normandy butter, with reproductions of photographs of dairying scenes.

An inquiry concerning Alpine dairies, C. Gorini (*Rev. Gén. Lait, 8 (1910), No. 7, pp. 155–161*).—After a personal investigation of the conditions under which cheese was made in the Italian Alps, the author found that the causes of the defects of cheese made in that region were due to the crude methods employed. The cheese was made under variable conditions, the temperature and acidity being determined by individual conjecture rather than by accurate methods.

History of cream separation.—I, Cream raising, B. Martiny (*Geschichte der Rahmgewinnung. I, Die Aufrahmung. Leipsic, 1909, pp. X+155+51+34, pls. 3, figs. 151*).—An historical account of different methods of raising cream which have been practiced from earliest times up to the invention of the separator. The dairy utensils employed in cooling the milk and raising and skimming the cream are illustrated and described. Appendixes contain reports of an experiment in which the different methods of cream raising are compared and also a bibliography of more than 500 references on the subject.

[Report of the dairy husbandman], R. C. Potts (*Oklahoma Sta. Rpt. 1909, pp. 27, 28*).—The average cost of making butter at the college creamery during a period of 2 years was 2.85 cts. per pound.

There is a brief report of investigations in butter making, some of the conclusions from which are as follows: "The higher the temperature of the cream or wash water used the higher will be the moisture content of the butter. The larger the granules churned and the larger the quantity of cream churned the higher the percentage of moisture in the butter. The churning of rich cream favored a high moisture content. The addition of cold water to the cream just as the butter was breaking did not prove to be an efficient way of increasing the moisture content of butter. Butter worked in a churn in the presence of a large quantity of water gave a leaky appearance and only medium moisture content."

Danish butter exports, 1908–9, B. Böggild (*Tidsskr. Landökonomi, 1909, No. 13, pp. 713–724; Mælkeritid., 22 (1909), No. 51, pp. 1115–1123*).—The article gives statistics, with prices received, and a discussion of the general conditions of the industry.

Butter and cheese making in Iceland (*Mælkeritid., 23 (1910), Nos. 2, pp. 21–35; 5, pp. 105–112*).—Extracts from a work on Icelandic dairying, by O. Olavius, and dated 1780, are given.

Fancy cheeses for the farm and factory, C. A. Publow (*New York Cornell Bul. 270, pp. 3–12, figs. 3*).—A bulletin of practical information on the manufacture of cottage, Neufchatel, cream, sandwich nut, pepper cream, caraway potato, olive cream, and club cheeses. The defects which commonly occur in the flavor and texture of cottage cheese are pointed out and remedies are suggested. The methods of making the fancy cheeses are described in detail, including both American and foreign methods of manufacturing Neufchatel.

Studies connected with the manufacture of early season cheeses, T. A. Coward (*Univ. Leeds and Yorkshire Council Agr. Ed. [Pamphlet] 77, 1910, pp. 15*).—The characteristics of early and late cheeses were studied with a view to overcoming the defects which commonly occur in cheeses made early in the season. Chemical analyses were made and compared with the results obtained by other investigators.

In a study of the bacterial flora of internal rust and off-flavor cheese, 3 chromogenic species of bacteria were isolated: *Bacillus prodigiosus* var. (?), *Bacterium acidi propionici* var. (?), and *Bacillus mahogani.* Suggestions are offered for preventing the growth of these organisms in order to obtain a more uniform product throughout the season.

On goat cheese and similar kinds of cheese, O. Iversen and O. Sopp (*Tidsskr. Norske Landbr., 16 (1909), No. 3, pp. 97–142*).—The subject of the manufacture of goat whey cheese and substitution products for this cheese is discussed in papers read before the Society for Norway's Weal, and the discussions following the reading of the papers are given in full.

The flavor of cheese, A. W. Dox (*Lookout, 15 (1910), No. 5, pp. 103–106*).—A short historical account of the chemistry of cheese ripening, presented in popular form.

Thirty years' activity of the experiment station for cheese making in Lodi, C. Besana (*Trent'Anni di Attività della R. Stazione Sperimentale di Caseificio di Lodi. Lodi, 1910, pp. 95, figs. 2*).—A historical account of the station is given, including a summary of the results of investigations undertaken since its organization in 1880.

Danish cheese production and exports, N. Hörlyck (*Tidsskr. Landökonomi, 1909, No. 5, pp. 265–288*).—A historical sketch and discussion of the present conditions of the industry.

Catalogue of the Postal Dairy Library, G. H. Benkendorf (*Madison, Wis., 1910, pp. 64*).—This is a catalogue by subjects of the Postal Dairy Library conducted by a member of the staff of the Wisconsin University and Station. It contains 1,006 titles relating to dairying and kindred subjects, together with an explanation of the purpose of the library and of the manner of using it.

VETERINARY MEDICINE.

Fourteenth semiannual report of the chief of the cattle bureau to the Massachusetts State Board of Agriculture, A. Peters (*Semiann. Rpt. Cattle Bur. Mass., 14 (1908), pp. 187–255*).—This report gives in detail an account of the work of the cattle bureau from December 1, 1907, to December 1, 1908.

Rabies diminished somewhat but continued to be very prevalent. More horses or mules, 941 in all, died or were destroyed in the State because of glanders and farcy than during any other year of which there is record.

A tabulated report of the inspection of animals, stables, etc., shows that 234,347 bovines were examined of which 177,047 were milch cows as compared with 237,647 bovines and 155,876 milch cows the previous year.

Calves purchased for experimental investigations of tuberculosis were inoculated subcutaneously and intravenously by Drs. Theobald Smith and P. A. Lewis with cultures of tubercle bacilli from the cervical lymph glands of 3 children suffering from that form of tuberculosis. All the calves developed acute and fatal tuberculosis, indicating that the disease in the children was of bovine origin. A case of tuberculosis in a horse was found to be due to infection from cattle, as a culture obtained by Dr. Smith from lesions in the horse's lungs showed the bacillus to be of the bovine type.

Brief mention is also made of a number of outbreaks of other diseases including hog cholera, blackleg or symptomatic anthrax, anthrax, actinomycosis, tuberculosis among swine, and mange among horses.

Sixth annual report of the Minnesota State Live Stock Sanitary Board for the year ending July 31, 1909 (*Ann. Rpt. Minn. Live Stock Sanit. Bd., 6 (1909), pp. 44*).—The method of dealing with tuberculosis in other countries is briefly reviewed and followed by a description of the method used in Minnesota, and the progress made. It is stated that the average losses to the wholesale butchers in Minnesota coming under government inspection will total at least $50,000 per year.

The total number of glandered horses destroyed was almost one-half less than in any previous year. An outbreak of anthrax resulted in the death of 40 hogs and 4 head of cattle. An outbreak of mechanical bronchitis in hogs in Waseca County appeared to have been due to the inhalation of pollen from clover. A number of outbreaks of infectious anemia or swamp fever of horses were investigated during the year, but this disease still seems to be unknown in the southern section of the State. The outbreaks of hemorrhagic septicemia were not as prevalent as formerly, and only a few outbreaks of vesicular exanthema were experienced. Rabies, blackleg, Johne's disease, avian tuberculosis, ergotism, hog cholera, suspected poisoning, strongylosis, lymphangitis, and other diseases, are considered in the report of the bacteriologist.

Seventh annual report of the state board of live stock commissioners of Ohio, T. L. Calvert, P. Fischer, and M. B. Lamb (*Ann. Rpt. Bd. Live Stock Comrs. Ohio, 7 (1908), pp. 32, pls. 3, figs. 12*).—The localities in the State in which foot rot, epizootic lymphangitis, glanders or farcy, hog cholera, nodular disease in sheep due to *Œsophagostoma columbianum*, rabies, mange in horses, scab in sheep, and tuberculosis in cattle occurred during the year are shown by means of maps. During the year 12 horses were destroyed on account of glanders and 29 dairy cows on account of tuberculosis.

Annual report of the state veterinarian of Wyoming for the year ending September 30, 1908, W. F. Pflaeging (*Ann. Rpt. State Vet. Wyo., 1908, pp. 24*).—Outbreaks of glanders occurred in 6 counties; in Bighorn County the disease has been prevalent for 4 or 5 years, having been introduced by a railway grading outfit. An outbreak of anthrax near the border line resulted in the loss of 100 head of cattle in the State and over 700 head in South Dakota. Necrotic stomatitis is the most serious swine disease in Wyoming at the present time; in one locality 42 hogs and in another 27 hogs being destroyed.

Lip and leg ulceration of sheep was prevalent in 6 counties. The quarantine for scabies in sheep was raised from the State and with the exception of in-

fected individuals found occasionally in importations the State is considered clean.

Losses from plant poisoning include 42 head of 4-year-old steers in eastern Converse County, evidently from a form of lupine poisoning. Twenty head of horses died from the effects of loco poisoning near Casper and a number of sheep in Bighorn County. Similar conditions among cattle were met with elsewhere in the State.

Annual report on the civil veterinary department, United Provinces, for the year ending March 31, 1909, E. W. Oliver (*Ann. Rpt. Civ. Vet. Dept. United Prov., 1909, pp. 21*).—This report discusses veterinary instruction, treatment of disease, breeding operations, etc.

Equine contagious diseases briefly mentioned are glanders, surra, dourine, and tetanus. Rinderpest was more prevalent, 6,662 deaths being reported against 7,854 during the previous year. Only 626 deaths due to hemorrhagic septicemia were reported against 1,799 the previous year. Of black quarter 143 cases occurred, of which 62 proved fatal, against 200 deaths the previous year. Anthrax destroyed 1,015 cattle as compared with 685 in 1907–8. Foot-and-mouth disease was very widespread and the mortality increased from 827 to 1,957. The number of deaths among cattle from other contagious diseases reported was 118.

Protective inoculations chiefly against rinderpest were carried out on a large scale, and whenever possible this method of dealing with disease is now adopted. Operations of this nature were undertaken in 1,084 outbreaks against 948 in the previous year and 90,874 animals have been inoculated.

Report of the principal veterinary surgeon and bacteriologist, S. Dodd (*Ann. Rpt. Dept. Agr. and Stock* [*Queensland*], *1908–9, pp. 81–105*).—In this report particular attention is given to the occurrence of and work with Texas fever, osteomalacia of cattle, or soft bone disease, and spirochetosis of fowls.

Texas fever is said to have been very prevalent in certain districts, and 31,865 head of cattle were inoculated. Osteomalacia which occurs among cattle, chiefly on some of the coastal lands, was investigated. The condition, one mainly affecting the bones of cattle, is most common in cows and heifers, chiefly dairy stock and especially heavy milkers. The symptoms, post-mortem appearances, and analyses made of bones from both normal and affected animals, are reported, as are also analyses of soils. As the result of investigations the author has determined that the disease of fowls in Rockhampton which has caused a mortality of from 60 to 80 per cent is spirochetosis.

Of 171,245 head of cattle killed at meat works under supervision during 1908–9, a total of about 0.7 per cent were totally or partially condemned for tuberculosis. Of 1,170 milch cows inspected, 11 were reported as being affected with tuberculosis and 8 with actinomycosis. Other diseases reported upon are infectious ophthalmia, contagious mammitis, contagious abortion, blackleg, strongylosis in sheep and calves, Birdsville horse disease, equine influenza, Gilbert River horse disease, hog cholera, sarcosporidiosis, and others.

Alleged poisoning by soy-bean meal (*Mark Lane Express, 103* (*1910*), *No. 4090, pp. 169, 171; Vet. Rec., 22* (*1910*), *No. 1127, pp. 545–549*).—Twenty-five out of 52 cows near Edinburgh, Scotland, which had been fed 1 lb. of soy-bean meal per day (distributed over 2 feeds) are reported to have died from poisoning thought to have been due to hydrocyanic acid from the meal. A suit against the firm from whom the meal was purchased, is under way.

Grain itch (Acaro-dermatitis urticarioides): A study of a new disease in this country, J. F. Schamberg (*Jour. Cutaneous Diseases, 28* (*1910*), *No. 329, pp. 67–89, pls. 7*).—A detailed account is given of an eruptive disorder new to

the physicians of this country, which, since 1901, has been appearing in the vicinity of Philadelphia and in Indiana, Ohio, and other States.

The disease is characterized by a wide-spread urticarioid eruption accompanied by intense itching and commonly by mild fever and other systematic symptoms. It is due to contact with cereals or straw infested with *Pediculoides ventricosus* or an allied species of mite. An identical or similar affection from contact with sacks of barley and wheat was noted by naturalists many years ago in France, Germany, Russia, and certain other European countries. This mite preys upon insects, particularly grain destroying insects. See also a previous note (E. S. R., 21, p. 587).

Special report on Sarcosporidiæ and their association with loco disease and dourine, E. A. WATSON (*Ottawa, Canada: Dept. Agr., 1908, pp. 12, pls. 2*).—This contribution has especial reference to the association of sarcosporidiosis with loco disease and dourine and the possibility of mistaking the spores of Sarcocystis for certain so-called developmental forms of trypanosomata. Six cases of sarcosporidiosis in cattle suspected of loco poisoning, 2 in equines suspected of loco poisoning, 3 in dourine-affected equines, and 1 in a cachectic filly, the cause of the cachexia not being known, are reported.

The following conclusions are drawn as the result of the investigations: "The parasitic Sarcocystis under certain conditions becomes a very important factor in disease, invading the entire musculature of their hosts, with serious or fatal consequences. Sarcosporidiosis may be closely associated with, and is probably a very frequent sequel to, the disease of horses and cattle known as loco disease. It may complicate the diagnosis of this disease, and also of dourine, and probably of some others, and retard or prevent recovery from these and similar cachectic conditions. The crescentic spores of sarcocystis bear a striking resemblance to crescentic bodies that have been described as developmental forms of trypanosomata, and it would be unsafe, or quite erroneous to diagnose an infection by the latter from the presence alone of those crescentic bodies."

The etiology of dourine, ZWICK and FISCHER (*Berlin. Tierärztl. Wchnschr., 25 (1909), No. 37, pp. 683–686, figs. 2; abs. in Jour. Trop. Vet. Sci., 5 (1910), No. 1, pp. 187–189*).—This disease had not been seen for 28 years in Germany, but has recently been introduced from Russia. The authors' more recent experiments with the trypanosome of European dourine in laboratory test animals seem to show that there is no ground for the opinion that any difference exists between the European and African disease. In the inoculation experiments here reported mice, guinea pigs, rabbits, dogs, cats, sheep, a goat, and an ox were used.

Dourine, MIESSNER (*Berlin. Tierärztl. Wchnschr., 25 (1909), No. 34, pp. 634–636; abs. in Jour. Trop. Vet. Sci., 5 (1910), No. 1, pp. 189, 190*).—This disease has attracted interest owing to an outbreak reported by Torenz and Kleinpaul in East Prussia in 1908. The guinea pig, rabbit, mouse, and rat were inoculated but none of these became infected with dourine. Treatment with arsenophenylglycin was followed by improvement.

A method of dealing with rinderpest in the field, A. GIBSON (*Jour. Trop. Vet. Sci., 5 (1910), No. 1, pp. 93–95*).—A short account is given of the way in which rinderpest has been successfully dealt with in Hongkong without the aid of a laboratory.

What Selangor is doing to prevent rinderpest (*Vet. Rec., 22 (1910), No. 1128, pp. 567, 568*).—An account of the work as carried on in the state of Selangor, on the Malay Peninsula. Quarantine stations are maintained at Port Sweettenham, Kuala Lumpur, and Kuala Kubu, for the purpose of preventing its spread among cattle.

East Coast fever, R. W. Dixon (*Agr. Jour. Cape Good Hope, 36 (1910), No. 1, pp. 19–26*).—A general account of this affection including preventive and remedial treatment.

East Coast fever (*Agr. Jour. Cape Good Hope, 36 (1910), No. 2, pp. 219–224*).—A statement of measures taken to safeguard the Cape of Good Hope Colony against the introduction of East Coast fever from the adjoining colonies of Natal and Transvaal. See also a previous note (E. S. R., 22, p. 581).

Spirochetosis of bovines in South Annam, H. Schein (*Bul. Soc. Path. Exot., 3 (1910), No. 2, pp. 73–75*).—A spirochetosis has been found to occur in South Annam. It appears to be due to the spirochete (*Spirochæta theileri*) found by Theiler in the Transvaal and by Heanley at Hongkong.

The Australian camel trade and trypanosomiasis, S. G. Haji (*Jour. Trop. Vet. Sci., 5 (1910), No. 1, pp. 72–88*).—Following a discussion of the occurrence of surra in camels in Australia the author reports upon several cases which were discovered in the province of Sind during 1908–9. This is the Indian province from which camels were imported into Australia, in several of which *Trypanosoma evansi* were discovered, as previously noted (E. S. R., 21, p. 78).

Summary of first series of experiments on treatment of surra in camels, A. S. Leese (*Jour. Trop. Vet. Sci., 5 (1910), No. 1, pp. 57–64*).—Experiments are reported in which tartar emetic alone, tartar emetic and atoxyl alternately, and tartar emetic alone but followed by a short course of mercury bichlorid alone, were administered.

No assistance toward ultimate recovery was afforded by the last-named treatment, and that with tartar emetic and atoxyl alternately gave no better results than the use of tartar emetic alone. As trypanosomes returned on the day following the last intravenous injection of bichlorid of mercury, it appears that the mercury did not have any effect upon them.

Note on plague infection in a wood rat (Neotoma fuscipes anectens), W. C. Rucker (*Pub. Health and Mar. Hosp. Serv. U. S., Pub. Health Rpts., 25 (1910), No. 1, pp. 1, 2*).—A wood rat, captured in Alameda County, Cal., October 17, 1909, and found to be infected with bubonic plague, is believed to be the first plague-infected wood rat ever discovered. Thus it seems that the wood rat may act as an intermediary in the transmission of the disease to other mammals. The manner in which the infection was conveyed to this rat is not known, as wood rats do not ordinarily come in contact with squirrels. Notes are included on the habits and distribution of this and related species.

Investigations concerning Rocky Mountain fever, H. T. Ricketts (*Bul. Johns Hopkins Hosp., 20 (1909), No. 218, pp. 151, 152*).—This is the report of an address before the Johns Hopkins Medical Society, January 4, 1909, in which the investigations previously noted (E. S. R., 21, p. 682) are discussed.

Some aspects of Rocky Mountain spotted fever as shown by recent investigations, H. T. Ricketts (*Med. Rec. [N. Y.], 76 (1909), No. 21, pp. 843–855*).—This is the Wesley M. Carpenter lecture of the New York Academy of Medicine for 1909.

As regards severity, the author recognizes 2 different types, the mild and the severe. In western Montana the disease is almost uniformly of a very severe character, the mortality ranging from 65 per cent to about 90 per cent. In Idaho, the death rate rarely rises above 5 per cent. It is said that both *Dermacentor venustus* and *D. modestus* will transmit the Montana disease to the guinea pig and that *D. venustus* will also transmit the Idaho disease. Experience has shown that the larvæ and nymphs as well as the adults acquire and transmit spotted fever.

The author believes spotted fever to be maintained as follows: A certain percentage of the female ticks which have acquired the disease as a consequence of feeding on animals which have been infected by other ticks, transmit the disease to their offspring through the egg. The new generation during the process of feeding transfers the virus to certain of the susceptible small wild animals (ground squirrels, rock squirrels, chipmunks, ground hogs, and perhaps others), and this may take place during either the larval, nymphal, or adult stage, hence at various times of the year. During the infection of the wild animals it is required that hitherto normal ticks, either as larvæ, nymphs, or adults, acquire the disease by feeding simultaneously with, or shortly after, the feeding of the infected ticks. Regardless of the tick's stage of development at the time it acquired the disease, the virus is retained into the adult period, and in certain of the females reaches the germ cells and again appears in the next generation.

The presence of tubercle bacilli in the circulating blood in clinical and experimental tuberculosis.—The viability of the tubercle bacillus, J. F. ANDERSON and M. J. ROSENAU (*Pub. Health and Mar. Hosp. Serv. U. S., Hyg. Lab. Bul. 57, pp. 42*).—From 48 cases of human tuberculosis, glycerin-potato cultures, guinea-pig inoculations, and smears were made from the sediment obtained by centrifugation of blood, but in not a single instance were tubercle bacilli demonstrated. In one instance the smears showed an organism that had the morphological and tinctorial appearances of tubercle bacilli, but the glycerin-potato culture and guinea-pig inoculations were negative.

"Tubercle bacilli were demonstrated in the blood of 7 of the 8 rabbits experimentally infected. In 3 of the 7 they were found both by cultures and by animal inoculations. From this it would seem that when rabbits are infected by subcutaneous inoculation of tubercle bacilli the latter are found in the circulating blood in a large proportion of the cases, but not in sufficient numbers to be detected in smears. It is of especial interest to note that the blood of a rabbit which at the autopsy did not present any naked-eye evidences of tuberculosis was infective for a guinea pig. Tubercle bacilli were found in the blood of only 1 guinea pig experimentally infected. It seems, therefore, that whereas tubercle bacilli are frequently found in the blood of tubercular rabbits, it is unusual to find them in the blood of tubercular guinea pigs and humans in numbers or virulence sufficient to infect fresh animals."

In part 2, the viability of the tubercle bacillus is discussed at some length. The results of investigations by various authors of the thermal death point of the tubercle bacillus, its viability in dried sputum under different conditions, the effect of sunlight upon it, and the period during which it remains virulent in water, etc., are brought together in tabular form. "We have no easy method of determining the death of the tubercle bacillus; its virulence fades before it dies. The criterion of death depends upon animal experimentation. The tubercle bacillus may be classed with the nonspore-bearing organisms so far as its viability is concerned. It is doubtful whether the waxy substance protects the bacillus against external harmful influences to any unusual extent. The thermal death point is 60° C. for 20 minutes. This is much less than was once considered."

A bibliography of the articles consulted is appended.

A contribution to the study of the ophthalmic reaction of cattle to tuberculin, O. BELLINI (*Arch. Sci. R. Soc. Accad. Vet. Ital., 7 (1909), No. 1–2, pp. 1–12; abs. in Rev. Gén. Méd. Vét., 15 (1910), No. 170, pp. 87–89*).—Of 200 bovines which were given the ophthalmic test at the abattoir at Mantoue, Italy, 29 gave positive reactions. All the animals were given a careful post-mortem examination, when the 29 reactors were found to be affected, as were also 3 of the animals which had not been detected during the test. The author is of the

opinion, however, that the reaction would have been detected in these 3 animals if they had been constantly observed, or for a longer period. The reaction appeared once after 5 hours, twice after 12 hours, once after 14 hours, 4 times after 16 hours, and 4 times after 17 hours. Again, much later reactions were observed, once after 24 hours, twice after 26 hours, once after 28 hours, and once after 37 hours. The reaction was of short durtion in 13 animals, having disappeared at the end of ½ hour in 1 case, after 1 hour in 2 cases, after 2 hours in 6 cases, after 3 hours in 1 case, and after 4 hours in 3 cases; in 5 other cases the disappearance was much slower.

The intra-cutaneous turberculin test, K. JOSEPH (*Berlin. Tierärztl. Wchnschr., 25 (1909), No. 46, pp. 847–851; abs. in Vet. Rec., 22 (1909), No. 1118, pp. 391–393*).—The author carried out a somewhat extensive investigation of this method, testing the results of each observation by the slaughter and careful post-mortem examination of the animal, whether reacting or not. The results are here reported and the methods described. The injection was made on the side of the neck instead of on the subcaudal fold of the skin as practiced by Moussu and Mantoux.

The intra-cutaneous test with tuberculin is highly commended by the author who points out the various advantages which it possesses over the ordinary subcutaneous test. It is thought that in addition to its value in diagnosis that the use of tuberculin in this way may be found to assist in prognosis. Experiments with guinea pigs conducted in association with Römer led to the belief that it is possible to gain information regarding the extent of tuberculous processes in these animals by repeated quantitative determinations of the subject's susceptibility to tuberculin.

Intestinal tuberculosis of the ox, P. CHAUSSE (*Ann. Inst. Pasteur, 23 (1909), Nos. 9, pp. 692–728; 10, pp. 809–829, figs. 30*).—A patho-anatomical study. The author recognizes 3 types of intestinal tuberculosis in the ox—the ulcerative, hypertrophic, and herpetic.

Respiratory metabolism investigation and its importance for zootechny and veterinary medicine with a contribution to the knowledge of pulmonary exchanges in bovines, J. PAECHTNER (*Respiratorische Stoffwechselforschung und ihre Bedeutung für die Nutztierhaltung und Tierheilkunde mit einem Beitrag zur Kenntnis vom Lungengaswechsel des Rindes. Berlin, 1909, pp. 64, pls. 4; rev. in Rec. Méd. Vét., 86 (1909), No. 23, pp. 849, 850*).—This work consists of 2 parts, the first being devoted to a historical review, while in the second personal investigations are reported.

The specific chronic enteritis of cattle [Johne's disease], H. HORNE (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 5, pp. 109, 110, fig. 1; abs. in Vet. Rec., 22 (1910), No. 1127, pp. 538, 539*).—The author considers his investigation upon an experimentally infected animal to indicate that cattle suffering from Johne's disease react to the cutaneous and ocular tests with avian tuberculin, as well as to the subcutaneous injection.

The treatment of mammitis in the cow, L. BIGOTEAU (*Rev. Gén. Méd. Vét., 13 (1909), No. 150, pp. 325, 326; abs. in Vet. Jour., 66 (1910), No. 416, pp. 114, 115*).—The treatment of mammitis in the cow by injections of boricated water, as reported by the author in 1905, is said to have since been employed in France and other countries with success.

The method consists of the injection of 120 to 180 gm. of a 3 per cent boric acid solution into the sinus of each affected quarter. The solution, made with boiling water, should be injected at a temperature of 20 to 25° C. At the same time a purgative should be given. It is necessary that the inflamed quarter be completely emptied before the injection is made.

Immunizing calves during gestation against white scour, K. von Sande (*Berlin. Tierärztl. Wchnschr., 25 (1909), No. 14, pp. 261–265*).—The director of Gans' Institute at Frankfurt reviews this subject at some length.

Out of 215 cows injected with 20 cc. of an extract from the bacilli of white scour, 91.63 per cent of the calves were rendered immune, 6.04 per cent succumbed to the disease, and 2.33 per cent recovered. The author concludes that by means of this extract, one may confer an immunity upon cows which is transmitted to the young and renders them refractory to the disease from the time of birth. The immunization of the cow is accomplished through two subcutaneous injections of the extract, the first of 10 cc. to be made 6 weeks before the termination of gestation is due, and the second of 20 cc. 10 days later. This treatment does not affect the general health of the cow.

A prophylactic treatment for white scour in calves during gestation, Fehrmann (*Berlin. Tierärztl. Wchnschr., 25 (1909), No. 7, pp. 139, 140*).—The author has used the Gans polyvalent germ-free extract from the bacilli of calf diarrhea with good results. The injection of this extract during an advanced stage of gestation appears to be capable of transmitting a protection to the fetus in utero which remains after birth as an active immunity.

Two diseases affecting pregnant ewes, J. A. Gilruth (*New Zeal. Dept. Agr., Vet. Div. Bul. 15, pp. 11*).—An account is given of the eversion of the vagina, which is at the present time probably the greatest cause of losses in sheep in New Zealand, and of the antepartum paralysis which has been found to exist throughout the Dominion although more prevalent in the south.

The caseous suppuration of sheep, H. Carré (*Rev. Gén. Méd. Vét., 15 (1910), No. 170, pp. 65–81*).—The author finds that purulent lesions of sheep are caused by a group of microbes which may be considered as varieties of the bacillus of Preisz-Nocard, and which in their morphological, cultural, and biological characteristics present very great analogies. The value of vaccination against the toxic forms appears to have been established experimentally, and practically it has given some very encouraging results. It is also possible to protect sheep against the affection by an umbilical and caudal dressing applied after birth. The affections due to the Preisz-Nocard bacillus are said to have a much greater distribution than is generally supposed.

The parasite of otocariasis of Congo goats, L. Gedœlst (*Arch. Schiffs u. Tropen Hyg., 13 (1909), No. 5, pp. 150–152; abs. in Jour. Trop. Vet. Sci., 5 (1910), No. 1, p. 206*).—The author examined material supplied by Broden and concludes that the parasite involved is *Psoroptes communis*.

Studies on the bacteriology of infectious swine diseases, R. R. Dinwiddie and J. F. Stanford (*Arkansas Sta. Bul. 105, pp. 315–350*).—This bulletin discusses bacteriological studies conducted during the course of 5 outbreaks of disease in hogs. The results of the investigation have led the authors to the following general conclusions:

"In natural outbreaks showing the anatomical lesions of hog cholera either *Bacillus choleræ suis* or Smith's swine plague bacteria may be present apparently acting as cause.

"Pneumonia occurring in hog cholera is generally due to the action of swine plague bacteria.

"Swine plague pneumonia is of frequent occurrence unassociated with contagion.

"All the symptoms and post-mortem lesions of hog cholera of natural origin may be produced by artificial infection with pure cultures of *Bacillus choleræ suis*. This artificially induced disease is transferable by cohabitation and by inoculation from one animal to another, but does not exhibit the extremely contagious features of the natural disease.

"Animals are easily immunized against swine plague bacteria by injection of sterilized cultures, the immunizing substance being resident in the bodies of the bacteria and not in solution in the fluid.

"Immunity against virulent hog cholera bacilli is safely and uniformly produced by inoculation with living cultures of naturally feeble virulence, but not by sterilized cultures.

"This double vaccination has not proved of practical value in the control of natural outbreaks in hogs."

Some original notes on the comparative immunizing properties of vaccine and aggressin in Schweineseuche, F. S. H. BALDREY (*Jour. Trop. Vet. Sci., 5 (1910), No. 1, pp. 46–51, chart 1*).—A brief report of experiments.

Spiroptera strongylina, B. F. KAUPP (*Mo. Valley Vet. Bul., 4 (1910), No. 11, pp. 29–31, figs. 4*).—This nematode is reported to have been taken from the stomach of hogs raised in the Missouri Valley. This is thought to be the first report of its occurrence in the United States.

Some notes on equine filariasis, E. P. ARGYLE (*Jour. Trop. Vet. Sci., 5 (1910), No. 1, pp. 96–100*).—Several cases are here reported.

Canine piroplasmosis in Tonkin, C. MATHIS (*Bul. Soc. Path. Exot., 2 (1909), No. 7, pp. 380–383; abs. in Jour. Trop. Vet. Sci., 5 (1910), No. 1, pp. 201, 202*).—The author states that in Asia this disease is known in India and China. He now records its occurrence in Tonkin at the veterinary infirmary at Hanoi, where it has often been found in both indigenous and imported dogs.

The drug treatment of canine piroplasmosis, G. H. F. NUTTALL (*Parasitology, 2 (1909), No. 4, pp. 409–434*).—Some earlier work on the subject by Italian investigators is reviewed, and further experiments with dyes, including brilliant green, benzopurpurine, and Congo red, are reported.

It was found that the first two of these dyes exert no injurious effect upon the parasite and that the piroplasms multiply in the usual manner up to the time of the animal's death. The three experiments with Congo red, however, demonstrate very clearly that the dye exerts a direct effect upon the parasites.

Protocols are presented relating to the continued infectivity of the blood of dogs described in an earlier paper (E. S. R., 21, p. 488). The author concludes that it is evident from these experiments that the parasites persist in the blood of dogs which have recovered from an acute attack of piroplasmosis in consequence of treatment with trypanblau and trypanrot.

The results obtained from the use of trypanblau by Jowett in South Africa (E. S. R., 22, p. 582) are briefly summarized. A summary with conclusions is also given of the results of experimental treatment of canine piroplasmosis by various authors. Trypanblau and trypanrot appear to be the only drugs that have definite preventive or curative action.

Contagious gastro-enteritis in dogs, S. H. GAIGER (*Jour. Trop. Vet. Sci., 5 (1910), No. 1, pp. 52–56, charts 5*).—The above name is given to a severe and absolutely fatal disease among dogs in Lahore which is here described.

The author has known the disease for the last 3 years, but not until the last few months has it caused such losses. It is estimated that during this time one-third of the better-class dog population has been wiped out. The pariah dog is immune, or carries the disease in a chronic form. "Examination of fresh mucus from the gastro-intestinal tract shows amebae in fair numbers, but no difference has been noted between these amebae and the amebae found in healthy dogs' feces. The disease is most probably conveyed from dog to dog by ticks."

Comparative physiological investigations of the normal rectal temperature, respiration, and heart beat of birds, particularly of the barnyard fowls, F. LÖER (*Vergleichend physiologische Untersuchungen über die normale Rektal-*

temperatur, Atem- und Pulfrequenz der Vögel, unter besonderer Berücksichtigung unseres Hausgeflügels. Inaug. Diss., Univ. Bern, 1909, pp. 26, charts 5).—Previous investigations on the subject are first reviewed, the temperature of different birds as reported by different investigators being given in tabular form.

The author's investigations were largely devoted to a study of the rectal temperature of fowls, the results of which are reported in tabular form. The factors considered include the influence on body temperature of age in the domestic fowl, turkey, guinea fowl, pigeon, pheasant, goose, and duck (E. S. R., 22, p. 72); of sex in the domestic fowl, turkey, pheasant, goose, and duck; of breed in the domestic fowl, turkey, and pheasant; of molting in the hen; and of food in the goose. The influence of setting and of the surrounding temperature are briefly considered, while the daily variation and the influence of hunger and thirst and of digestion are shown by means of charts. The temperature of 72 species, representing 31 families of exotic birds at the zoological gardens in Halle and Leipsic, is also reported.

The respiration of 90 hens observed varied in frequency from from 12 to 28 per minute with an average of 18.44; of 40 turkeys from 12 to 16 with an average of 13.4; of 90 pigeons from 16 to 36 with an average of 25.51; of 40 geese from 12 to 20 with an average of 13.10; and of 90 ducks from 16 to 28 with an average of 18.84.

The body temperature of fowls, F. Löer (*Deut. Tierärztl. Wchnschr., 17 (1909), No. 47, pp. 698–700, charts 4; abs. in Rec. Méd. Vét., 86 (1909), No. 23, pp. 843, 844*).—The temperature readings of numerous individuals of different breeds of the domestic fowl, as summarized in the account above noted, are here reported in tabular form, accompanied by charts.

Diseases of fowls, G. Bradshaw (*Dept. Agr. N. S. Wales, Farmers' Bul. 15, pp. 101, pls. 2, figs. 18*).—A second edition of this general account of diseases of fowls to which several additional diseases, notably infectious enteritis, which is said to have had devastating effects on several of the large poultry farms, have been added.

Fowl plague is not a contagious disease, E. Marchoux (*Compt. Rend. Soc. Biol. [Paris], 68 (1910), No. 8, pp. 346, 347*).—The author's experiments appear to show that fowl plague is not conveyed through the feces. He considers it probable that the transmission takes place through some acarid other than the fowl tick.

A new lucocytozoon of the fowl, C. Mathis and M. Leger (*Compt. Rend. Soc. Biol. [Paris], 68 (1910), No. 1, pp. 22–24*).—A second species of Leucocytozoon discovered in the blood of the domestic fowl in Tonkin is here described as *L. sabrazesi*. It was found in 5 of 439 fowls examined. This is thought to be the first time that 2 species of Leucocytozoon have been recorded from the same bird host.

A study of parasitic typhlitis. The nodules of cecum parasites of the pheasant, M. Letulle and Marotel (*Arch. Par., 12 (1909), No. 3, pp. 361–368, figs. 2*).—Nodules formed by the nematode *Heterakis vesicularis* are here considered.

The intestinal coccidiosis of young animals, J. Basset (*Bul. Soc. Cent. Méd. Vét., 86 (1909), No. 22, pp. 463–481, figs. 2*).—A brief account of this affection in the domestic fowl, pheasant, pigeon, rabbit, hare, ferret, and dog.

The spirochetes found in the crystalline style of Tapes aureus: A study in morphological variation, H. B. Fantham (*Parasitology, 2 (1909), No. 4, pp. 392–408, pl. 1, figs. 2*).—The author concludes that the spirochetes of *T. aureus* are all referable to one species. This is probably either *Spirochæta balbianii*, which also occurs in the oyster, or a variety of the same.

The Thelazies, nematode parasites of the eye, A. RAILLIET and A. HENRY (*Compt. Rend. Soc. Biol.* [*Paris*], *68* (*1910*), *No. 5, pp. 213–216*).—Five species of Thelazia parasitic in mammals are noted, of which 3 are described as new to science.

The Onchocerces, nematode parasites of the conjunctival tissue, A. RAILLIET and A. HENRY (*Compt. Rend. Soc. Biol.* [*Paris*], *68* (*1910*), *No. 6, pp. 248–251*).—Five species of Onchocerca are recognized of which 2 are described as new.

Filariæ in the vitreous chamber of the eye of a camel—ophthalmia, A. S. LEESE (*Jour. Trop. Vet. Sci., 5* (*1910*), *No. 1, pp. 89–92, figs. 2*).—The case here reported was due to a new species which Railliet has named *Thelazia leesei*.

Some helminths of Python sebæ, A. RAILLIET and A. HENRY (*Bul. Soc. Path. Exot., 3* (*1910*), *No. 2, pp. 94–98*).—In a post-mortem examination of a python killed at the Pasteur Institute at Paris, a cestode and 4 species of nematodes were found.

Animal parasites and parasitic diseases, B. F. KAUPP (*Chicago, 1910, 2. ed., rev., pp. XII+9–211, pls. 11, figs. 73*).—A second revised edition (E. S. R., 20, p. 883).

A preliminary check list of the parasites of Indian domesticated animals, S. H. GAIGER (*Jour. Trop. Vet. Sci., 5* (*1910*), *No. 1, pp. 65–71*).—The parasites of domestic animals which have been found in India are listed.

RURAL ENGINEERING.

Traction plowing, L. W. ELLIS (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 170, pp. 45, fig. 1*).—The history and adaptability of steam and gasoline tractors for plowing purposes in the United States are briefly outlined and internal combustion engines discussed.

The 3 sections in which traction plowing is common are the Pacific Coast States, the Northwestern States, and the Southwestern States. The equipment for traction plowing and its cost are treated in such a way as to present information of value to one who operates or contemplates securing a traction outfit. Disk and moldboard plows and steam and internal combustion traction engines are discussed with special reference to their cost and the conditions to which they are especially adapted and suggestions given as to the miscellaneous equipment needed.

The cost of operation, repairs, labor, water supply, plowing capacity, and income from traction plowing outfits are fully dealt with. Tables show the prices commonly charged for traction plowing, the estimated acre cost with gasoline and steam plowing engines and with horses, and the relative number and requirements of the various types of motive power. The cable system of steam plowing is outlined.

The average cost per acre of plowing with steam in California is estimated at 85.3 cts., in the Southwest \$1.14, in the Northwest \$1.73 and in Canada \$1.898, while that of plowing with gasoline engines is set at \$1.119 and \$1.457 in the Southwest and Northwest, respectively. With horses the average cost on the Minnesota farms reported was \$1.201 for fall plowing and \$1.258 for spring plowing.

An experiment in clearing logged-off land by the aid of a donkey engine in 1908, W. H. LAWRENCE (*Washington Sta. Bul. 1, spec. ser., pp. 3–15*).—Tests to determine the rapidity, effectiveness, and cost of clearing land with a donkey engine are reported.

A 13-acre tract, adjacent to a tract cleared as previously noted (E. S. R., 9, p. 295) was cleared, by the use of a donkey engine and stumping powder, of about

40 stumps per acre, varying in diameter from 1 to 5½ ft. and from a heavy growth of underbrush. The cost was at the rate of $71.90 an acre.

The author concludes that "a donkey engine built for logging purposes is not properly constructed for land clearing. Clearing land with a donkey engine poorly operated is very expensive, while such a machine properly manned by a good crew is, on the whole, quite satisfactory. The usual way of piling and burning stumps and other débris destroys the soil. The 'windrow' method is a more satisfactory way of piling and burning. The clearing of land by the aid of a donkey engine is not as expensive a method as the impression, gained from estimates generally given [indicates]. Stumping powder and the donkey engine are quite satisfactory and rapid, but rather expensive, agents to use in clearing logged-off land."

Tests of pumping plants in New Mexico, 1908–9, B. P. FLEMING and J. B. STONEKING (*New Mexico Sta. Bul. 73, pp. 50, figs. 10*).—This bulletin describes a series of tests of seven plants made in cooperation with the Irrigation Investigations of this Office.

The methods of making the tests and their details are given and the results summarized. There is also a diagram from which it is possible to determine the practicability of pumping under given lifts and given yields and prices of crops. The object of the tests, as stated by the authors, was "to determine as nearly as may be, not only the efficiency of the pumping plant as a machine (which, while of interest to the engineer, is rarely understood by the farmer) but to determine also the fuel use in terms of the head and water pumped and the total cost of operation including such items as fuel, lubricating oil, attendance, interest, and taxes, estimated depreciation, and wherever possible, the actual area irrigated or capable of being irrigated."

The power developed by the engines was determined by indicator and brake tests. The lifts were determined by the use of pressure and vacuum gages and the water pumped was measured over weirs, making the results unusually accurate. The authors developed a new method of determining the power developed in the engines, in which, as "all the gasoline engines tested were of the hit-and-miss type, the necessity of using an indicator was obviated by determining beforehand the relation between horsepower developed by the engine and the number of explosions per minute, so that during pumping the power delivered to the pump at any time could be determined by simply counting the number of explosions in a given interval of time. This method was tested thoroughly before trying it in actual pump tests, a small engine being rigged up by attaching a friction brake to a fly wheel and by connecting up the exhaust-valve motion with a stroke counter in such a way that the explosions during a given length of run would be automatically recorded. In addition a small fuel tank was supported on a spring balance weighing to ounces in such a way that the fuel used could be accurately weighed. The engine was then run at several different brake loads during intervals of 10 minutes each and the relation between horsepower developed and number of explosions per minute was platted on cross-section paper."

Four of the seven plants tested had gasoline engines, one a crude-oil engine, and two steam engines. All of the pumps tested were centrifugal except one, which was a bucket pump. The summaries show the lift, with the fuel cost per acre-foot and per foot-acre-foot. With the gasoline engines the total cost per foot-acre-foot varied from 12.8 to 28.6 cents, the high cost being with the bucket pump, and due largely to the low efficiency of this type of pump. The efficiencies of the pumping plants varied from 31.6 per cent for the gasoline engine with bucket pump, to 51.8 per cent for one of the gasoline engines and

centrifugal pumps. The efficiencies of the two steam engines with centrifugal pumps varied from 42 to 40.8 per cent, and that of the crude-oil engine was 37.2 per cent.

Farm drainage operations, W. H. DAY (*Ontario Dept. Agr. Bul. 175, pp. 38, figs. 22*).—This bulletin, which supplements Bulletin 174, previously noted (E. S. R., 22, p. 589), gives directions for making and using a home-made drainage level, making and recording differential levels, determining the grade of the drain, and preparing a profile. The limitations of the spirit level for drainage work are discussed and directions given for testing and correcting it. The method of making careful surveys for complete drainage systems is explained in full for the purpose of aiding the farmer in understanding a map and preparing and constructing his drains according to it. A table is presented for use in determining the size of tile to be used in the main drain carrying the maximum Guelph rainfall from various areas through drains with grades from a fall of 1 ft. in 2,000 to 1 ft. in 20. Directions for digging, grading and filling ditches, laying tile, and for constructing outlets and sand traps are also given.

Sand-clay and earth roads in the Middle West, W. L. SPOON (*U. S. Dept. Agr., Office Public Roads Circ. 91, pp. 31, figs. 6*).—This circular gives the results of experiments in sand-clay road construction conducted in Kansas in 1908.

Previous to the inquiry it had been supposed that this method was inapplicable to the North and West on account of frost and a lack of clay or sand suitable for the purpose. The soil conditions, climate, and drainage in the Middle West, and the construction of sand-clay roads in the gumbo or plastic soil sections, on loam and alkali soils, and on sand-hill roads, is discussed in detail, together with the use of sand-oil covering for these roads.

Experimental roads were constructed with local materials at Garden City, Dodge City, Bucklin, and Ford, Kans., the cost ranging for the first three of these localities from $707.45 to $1,183.64 per mile. It is believed that a careful study of local conditions in any community will usually reveal many possibilities for improving roads at a comparatively small cost.

Report on the service condition of paints (*North Dakota Sta. Paint Buls. 1, pp. 5–54, figs. 34; 2, pp. 90; 3, pp. 36, figs. 15*).—Reports on the service condition of paints on test fences at the station (E. S. R., 19, p. 1089), by representatives of the Paint Manufacturers' Associations of the United States and of two paint manufacturers, are presented in detail.

RURAL ECONOMICS.

The incomes of 178 New York farms, M. C. BURRITT (*New York Cornell Sta. Bul. 271, pp. 15–27, fig. 1*).—The purpose of this investigation was to determine what income could reasonably be expected from a farm investment in New York and what type of farming offered the best investment. The data reported are for the two years 1906 and 1907.

The method of calculating returns was to include as gross income all cash receipts plus any increase in property values on hand, while expenses included all cash expenditures plus any decrease in property values. The net income, therefore, represented the difference between receipts and expenses and included interest on the investment, while the value of the farmer's labor was derived by deducting from the net income the interest at 5 per cent on the invested capital. The data thus determined on 5 classes of farms were as follows:

The relation of capital, income, and expense to profit—Averages of 178 farms.

	Dairy farms.	General farms.	Fruit farms.	Potato farms.	Truck farms.	Average of all farms.
Number of farms	67	60	31	14	6	178
Total capital invested	$10,417	$11,327	$12,895	$11,801	$6,652	$11,137
Gross income	2,529	2,327	4,503	3,118	1,884	2,829
Expense	1,318	1,130	1,651	1,207	939	1,291
Net income per farm	1,211	1,197	2,852	1,913	945	1,538
Farmer's labor income	690	631	2,207	1,321	612	981
Per cent on the investment	8.7	7.9	19.8	13.7	9.7	11.1

Following the method of calculation, therefore, it appears "that the average of these farmers, after making interest at 5 per cent, has had the use of a house and such produce as the farm furnished in addition, and has made $981 above all farm expenses and above the value of farm labor done by members of the family other than himself;" that fruit farming in New York yielded the highest percentage (19.8) and general farming the lowest percentage (7.9) on the investment; and that the fruit farmers were the best paid men of all classes under consideration. The cost of labor, excluding the owner's labor, ranged from $409 on truck farms to $789 on fruit farms, though the high cost of labor on fruit farms is attributed in part to the extra men and board required at harvesting time.

Comparisons are also made of the various factors on the most successful and least successful of 86 farms taken as a whole, and also when grouped into 28 general farms, 40 dairy farms, and 18 fruit farms. These data show that the average percentage "of profit for the 86 farms was 12.8 per cent. For the poorest class it averaged but 5.8 per cent, while for the best class the average was 19.1 per cent. One of the first facts to be observed is that in every comparison the total acreage, arable acreage, and the capital of the best farms is considerably larger.

"The income on the most profitable farms averages about double that of the least profitable farms, but the expenses are about the same. The better farmers seem to have secured their greater profits not by spending less but by taking in more.

"In regard to the distribution of the capital, we find that the best farms uniformly have the largest real estate value and much larger machinery and implement, horse and other live stock values, which emphasizes the need of a larger capital. Expense for seed and feed is somewhat larger on the best farms on an average, but higher on dairy farms than on the others. The best farms spent nearly twice as much for fertilizers and considerably more for machinery and repairs and buildings and fences. The most profitable farms had $76 greater labor expense than the least profitable."

The greatest factor in the citrus industry (*Cal. Cult., 34 (1910), No. 8, p. 227*).—This is an account of the conditions surrounding the citrus industry in California prior to the formation of the Southern California Fruit Exchange in October, 1895, and a brief account of this organization up to March, 1905, when its name was changed to the California Fruit Growers' Exchange and its sphere of activity enlarged to include practically the whole of California.

The business methods and the amount of business transacted by the society are described. Its success is shown by the fact that for three years the gross sales amounted to $51,442,168.61, the losses on which amounted to only $391.45. "On the old basis the fruit commission men charged 5 per cent for guaranteeing sales. The saving to the fruit men thus amounts to $2,571,716.98 in these three years by the new method of marketing."

Cooperative organizations of fruit-growers (*Dept. Agr. N. S. Wales, Farmers' Bul. 26, pp. IV+15*).—Information is given regarding the constitution of fruit-growing associations in California, the agreements mutually entered into by the grower and the exchange as to sales, rates of selling commissions, purchase of supplies, disbursements, dividends, and minor details, and methods of handling and marketing the fruit. Among the associations particularly described are the California Fruit Exchange, Loomis Fruit-grower's Association, California Fruit-growers Exchange, and the California Raisin Growers' Association.

Agricultural organizations in New York State, R. R. Riddell (*N. Y. Dept. Agr. Bul. 13, pp. 59*).—A list of 984 active organizations which have been established for the purpose of advancing one or more phases of agriculture within the State of New York, together with the names and addresses of officers, date of organization, membership, etc., is given in this bulletin.

The Jewish Agricultural and Industrial Aid Society, L. G. Robinson (*Jewish Agr. and Indus. Aid Soc. Ann. Rpt. 1909, pp. 65*).—This report for 1909, while conforming largely in plan and purpose to that of preceding years (E. S. R., 20, p. 1195), contains a summary of the first ten years' work of the society, including the method of furnishing financial assistance.

"It will be interesting to note that, whereas in the first year of our existence we made but 39 loans, aggregating $14,425 to 41 farmers, in the past year we made 256 loans, aggregating over $141,000 to 311 farmers. Our outstanding farm loans during the period in question have increased from $7,500 to nearly half a million dollars, and the total amount of farm loans made during the ten years aggregates nearly $800,000. The first loans were virtually confined to New Jersey and Connecticut; to-day our operations cover 24 States and Canada."

Loans bear a low rate of interest, generally 4 per cent, repayable in moderate annual installments, and are usually secured by a second mortgage frequently supplemented by a chattel mortgage or other collateral. A table arranged alphabetically by States gives the total number of known Jewish farmers in the United States at the close of 1909 as 3,040 occupying 2,701 farms. The educational and cooperative work of the society is also described in detail.

The union of agricultural associations of the southeast, H. Sagnier (*Jour. Agr. Prat., n. ser., 18 (1909), No. 48, pp. 733–735*).—This is a summarized account of the proceedings of the organization at its twentieth annual meeting held at Lyon, France, November 23 and 24, 1909.

The union operates in 10 departments, and on October 31, 1909, consisted of a coalition of 428 associations with 117,000 members. The business transacted in 1908 included cooperative buying and selling 2,856,803 francs (about $551,363); furnishing credit through 115 local banks 2,572,838 francs; live stock insurance through 76 banks 1,600,000 francs; fire insurance by 340 banks with 15,000 members totaling 88,000,000 francs; and insurance against accidents with 20,000 families embracing 200,000 hectares. A new feature was the establishment of the "caisses dotales," or banks for encouraging the young rural people of both sexes to accumulate their savings as a marriage dowry. Other lines of work conducted in 1908 are also discussed.

The law of January 2, 1910, establishing a fund for the promotion of agricultural credit in the provinces of Marches and Umbria (*Bol. Min. Agr. Indus. e Com. [Rome], 9 (1910), Ser. A, No. 5, pp. 81–85*).—The text of the law is reported. Funds of 700,000 lires (about $135,100) and 400,000 lires, of which 200,000 lires and 300,000 lires, respectively, are advanced by the government, are established for promoting agricultural credit in the respective provinces. For the first 10 years no interest is required on the government fund, but there-

after interest at 2 per cent per annum is to be charged. Interest rates by the banks for discounting agricultural bills of exchange, etc., are limited to 4 or 5 per cent. The purposes for which money can be borrowed, the amounts and security required, and the control of the funds are fully prescribed in the law.

Agricultural cooperation and credit in Spain, A. MARVAUD (*Rev. Écon. Internat., 6 (1909), IV, No. 3, pp. 539–556*).—This article reviews the history and development of agricultural credit institutions in Spain. The functions and modifications of the "positos," or grain depositories, as established under the Roman period are described in detail, together with a summarized account of the present status, membership, and business of agricultural mutual credit banks. A bibliography of modern literature is included.

Cooperative credit in Burma (*Indian Agr., 35 (1910), No. 1, pp. 6, 7*).—The progress, status, and conditions of agricultural credit in Burma are discussed in this article.

On July 1, 1909, the societies numbered 174 with 5,356 members as compared with 81 and 3,085, respectively, the preceding year, while the capital had increased nearly threefold. The rural population, even in the remotest districts, is said to be enthusiastic for cooperative credit as a means of relief from debt and the professional money-lender.

Agricultural cooperative credit societies, F. R. JORDAN (*Dept. Agr. N. S. Wales, Farmers' Bul. 3, pp. 40*).—This is a summary of the organization and development of the various forms of agricultural credit societies in Europe, compiled with a view of encouraging the organization of such societies in New South Wales.

Crop Reporter (*U. S. Dept. Agr., Bur. Statis. Crop Reporter, 12 (1910), No. 4, pp. 25–32, fig. 1*).—Statistical data on the yields, condition, and acreage of farm crops in the United States and foreign countries, and on the condition and loss of farm animals, the farm values of important crops, and the range of prices of agricultural products in the United States are presented and discussed.

The geographical distribution of grain prices in India, T. H. ENGELBRECHT (*Die geographische Verteilung der Getreidepreise—II. Indien. Berlin, 1908, pp. VIII+112, pls. 16*).—The statistical data summarized regarding the grain prices in India cover a period from 1861 to 1905.

AGRICULTURAL EDUCATION.

Redirection of high schools in agricultural communities (*School Ed., 29 (1910), No. 8, pp. 17, 18*).—This article calls attention to the need of increased agricultural production and of a new attitude toward agriculture as a basic industry.

From the standpoint of education the problem is recognized as almost wholly in secondary lines. Without arguing against the special agricultural high school the author points out some of the advantages of utilizing the existing public high school for agricultural teaching, as avoiding (1) the expense of new plants, (2) class education of rural populations, and (3) the loss of home training and influence, while it (1) positively "directs the city boy countryward," (2) preserves the local independence of the school, and (3) broadens and vitalizes the influence of the institution. The object sought is said to be "not agricultural schools, but agriculturalized schools."

The plan advised for accomplishing this is to redirect and improve the curriculum of the ordinary rural school, to make the division between it and the high school at the end of the sixth grade, and to group the high-school work in two sections of three grades each. A detailed outline of work for the

seventh, eighth, and ninth grades is offered, including $1\frac{1}{2}$ years of German, agriculture, and domestic science. The last 3 years' work in the high school "may be made college preparatory, vocational, or both, as conditions seem to require."

The carrying out of this plan involves securing a competent instructor for agriculture to be in service 11 months in the year. He should conduct the class work in that subject, manage an experimental school farm of 5 to 25 acres, give a winter course for older students, and carry on the following forms of extension work: (1) Rural acquaintance, (2) rural school visitation and work, (3) rural school-house meetings and farmers' clubs, (4) industrial contests, and (5) local farmers' institutes.

Agricultural education: State normal schools, B. M. Davis (*El. School Teacher, 10 (1910), No. 8, pp. 376–387*).—This article reviews the work already done by various state normal schools in establishing training courses in agriculture, calls attention to the scarcity of prepared teachers and the difficulties in the way of preparing them, and continues the bibliography of helpful publications begun in earlier articles of this series.

The College of Hawaii, J. W. Gilmore (*Hawaii. Almanac and Ann., 36 (1910), pp. 148–155*).—This article consists of a brief reference to the steps leading up to the establishment of the college, followed by a description of its courses of study and field of service.

The curriculum in forestry education, F. Roth (*Forestry Quart., 8 (1910), No. 1, pp. 17–25*).—The author of this paper compares the course of study in forestry with that in law, agriculture, and other professions, and believes that the length of time spent in such study is determined largely by the student himself. He states that the old empirical basis for the professional course in forestry was established over 100 years ago and has been enlarged by study, comparison, compilation, and controversy to as great a length as students at the present time are willing to devote themselves to such study.

The author calls particular attention to the value of those "parts of the curriculum not guaranteed by the printed circular, but which are the essentials which the name of the school and its teachers must vouch for;" namely, the particular relation or attitude of the teacher, student, and school to the subject studied. He holds that the problems in the forestry course still unsettled may be summarized as follows: (1) Whether the course should be given at a university or a technical college; (2) the length of the course; (3) the secondary preparation required; (4) the proper proportion of time to be given to technical forestry studies; (5) the proportion of time to be given to accessory studies; (6) the proper balance of technical forestry studies in reference to each other; (7) the proper amount of practice or field work, and the conditions of securing it; (8) to what extent the curriculum should be represented in Civil Service examinations; and (9) what minimum program of studies should be required for admission to such examinations.

Syllabus of illustrated lecture on wheat culture, J. I. Schulte (*U. S. Dept. Agr., Office Expt. Stas., Farmers' Inst. Lecture 11, pp. 22*).—This lecture, for which 45 lantern slides have been prepared, covers the history, botany, composition, improvement, distribution, cultivation, harvesting, and storage of wheat, arranged for use in farmers' institutes. A list of 45 references is appended.

Essentials of successful field experimentation, C. E. Thorne (*Ohio Sta. Circ. 96, pp. 38, figs. 21*).—This publication is in the main a reprint of the syllabus of an illustrated lecture prepared for the Farmers' Institute Specialist of this Office, and previously noted (E. S. R. 17, p. 819).

MISCELLANEOUS.

Biennial Report of Connecticut Storrs Station, 1908–9 (*Connecticut Storrs Sta. Rpt. 1908–9, pp. XLI+482*).—This contains the organization list, a financial statement for the fiscal years ended June 30, 1908 and June 30, 1909, reports of the director and heads of departments, reprints of Bulletins 49–58, an article entitled The Intracellular Enzyms of Penicillium and Aspergillus with Special Reference to Those of *Penicillium camemberti*, abstracted on page 703 of this issue, and a general weather review, abstracted on page 711 of this issue.

Eighteenth Annual Report of Oklahoma Station, 1909 (*Oklahoma Sta. Rpt. 1909, pp. 142*).—This contains the organization list, a report of the director, a financial statement for the fiscal year ended June 30, 1909, reports of heads of departments, of which portions of those of the dairyman and the chemist are, together with an account of the new hog barn, abstracted elsewhere in this issue, and reprints of Bulletins 82–85, previously noted, and of press bulletins entitled Handling Milk and Cream in the Dairy during the Hot Months, Alfalfa, Selecting Seed Corn, The Twig Girdler, A Soil Survey of Oklahoma, Selection of Breeding Hogs, Onions, How to Grow Sweet Potato Plants, Black Leg Vaccine, Broom Corn Culture, The Oklahoma Bee Keeper's Calendar and Honey Plant List, Hog Cholera, and Transferring Colonies of Bees.

Annual Report of South Dakota Station, 1909 (*South Dakota Sta. Rpt. 1909, pp. 3–40*).—This contains a report by the director on the personnel, publications, and exchanges of the station, a financial statement for the fiscal year ended June 30, 1909, and departmental reports, of which portions of that of the agronomist are abstracted on pages 711 and 727 of this issue.

Twenty-first Annual Report of Vermont Station, 1908 (*Vermont Sta. Rpt. 1908, pp. XXXI*).—This contains the organization list, a brief announcement concerning the station, a financial statement for the fiscal year ended June 30, 1908, and a report of the director on the work and publications of the station, which includes a discussion of the functions of experiment stations and brief statements concerning the various departmental activities of the year.

Director's report for 1909, W. H. Jordan (*New York State Sta. Bul. 321, pp. 439–458*).—This contains the organization list and a review of the work and publications of the station for the year, with a discussion of its needs and functions.

The work of the department of cooperative experiments, L. H. Goddard (*Ohio Sta. Circ. 97, pp. 8*).—This circular outlines proposed cooperative work in 1910 between the station and farmers in field experiments, fair exhibits, and farm management investigations.

Accessions to the Department Library, October-December, 1909 (*U. S. Dept. Agr., Library Bul. 74, pp. 68*).

Monthly bulletins of the Department Library, January and February, 1910 (*U. S. Dept. Agr., Library Mo. Bul., 1 (1910), Nos. 1, pp. 23; 2, pp. 48*).—These publications, which succeed the quarterly bulletins entitled Accessions to the Department Library (see above), contain for the months of January and February, 1910, respectively, corresponding data as to the accessions to the Department Library and also recent additions to the list of periodicals currently received (E. S. R., 22, p. 595).

Experiment Station Work, LVI (*U. S. Dept. Agr., Farmers' Bul. 388, pp. 32, figs. 7*).—This number contains articles on the following subjects: Incompatibles in fertilizer mixtures, principles of dry farming, methods of seeding oats, rolling *v.* harrowing winter wheat, destruction of eelworms in garden and greenhouse soil, pruning, bean anthracnose or pod spot, animal feeds for farm stock, feeding the pig, and jelly and jelly making.

The work and significance of the agricultural experiment stations in the Netherlands, and especially of that at Wageningen (*De Werkkring en Beteekenis van de Rijkslandbouw-Proefstations in het Algemeen en van het Rijkslandbouw-Proefstation Wageningen in het Bijzonder. The Hague, 1909, pp. 17, figs. 4*).—An account is given of the establishment, history, organization, and work of the various experiment stations in the Netherlands, with particular reference to that at Wageningen.

Indiana farm laws with business forms and letters, W. K. WILLIAMS (*Columbus, Ohio, 1910, pp. 246*).—This contains the text of the laws of Indiana pertaining to agriculture and to farm life, arranged by subjects, together with specimen business forms and business letters and an index to the laws.

[Laws of Iowa pertaining to agriculture] (*Iowa Yearbook Agr., 9 (1908), pp. 944–958*).—This section presents the text of the Iowa laws pertaining to the duties of the state department of agriculture, the collection of agricultural statistics, defining what shall constitute a lawful fence, requiring state enrollment of stallions kept for public service, giving the owner or keeper of a stallion a lien upon his get for service fee, and the destruction of weeds.

The agricultural law of the State of New York (*N. Y. Dept. Agr. Bul. 11, pp. 3c–99c*).—The text is given of the agricultural law of the State of New York, constituting chapter 1 of the consolidated laws of the State, which went into effect February 17, 1909.

The standard cyclopedia of modern agriculture and rural economy, edited by R. P. WRIGHT (*London, 1908, vols. 1, pp. VII+240, pls. 13, figs. 91, chart 1; 2, pp. VIII+240, pls. 18, figs. 102; 3, pp. VIII+248, pls. 17, figs. 125; 1909, 4, pp. VIII+240, pls. 18, figs. 108, chart 1; 5, pp. VIII+256, pls. 16, figs. 96; [1909], 6, pp. VIII+256, pls. 19, figs. 139; 1910, 7, pp. IX+256, pls. 18, figs. 84*).—This encyclopedia contains definitions of agricultural terms and articles by a corps of English specialists pertaining to practically every phase of agriculture. Of the volumes thus far issued, volume 1 extends from Abatement to Auricula, volume 2 from Australia to Broadcast Sowers, volume 3 from Broadcast Sowing to Cocoa, volume 4 from Coconut to Ducks, volume 5 from Ducks to Firlot, volume 6 from Fish Guanos to Hemlock, and volume 7 from Hemlock to Lancashire Cheese.

NOTES.

Arizona Station.—G. E. P. Smith, irrigation engineer, has been granted a year's leave of absence. He will visit irrigated districts in southern Europe and northern Africa during the summer and will then probably return to this country for a technical study of pumping devices during the remainder of the year.

California University.—Several new buildings have been erected during the year for the school of agriculture at Davis, including a dining hall, horticultural building, veterinary clinic, horse and sheep barns, poultry houses, a grape house, and an addition to the seed house.

Exercises in celebration of the completion of these buildings were held at the school May 3, with an attendance of 2,400. The program consisted of a basket picnic and of addresses by Presidents Benjamin Ide Wheeler, of the university, and David Starr Jordan, of Leland Stanford Junior University, Profs. E. W. Major, C. M. Haring, M. E. Jaffa, and W. T. Clarke, and Miss Katherine Winans.

Georgia College.—A special course in cotton grading and agriculture will be offered from June 27 to July 29, in cooperation with the university summer school. Special emphasis is to be laid on cotton grading and plant breeding as affecting the improvement of the fiber. Elementary courses in soils, agronomy, and plant production which will be of special interest and benefit to teachers will also be provided.

Extension schools for teachers are being organized at several points in the State in cooperation with the county school commissioners. The plan is to have the staff of the extension department take charge of these institutes and organize work along lines which will enable the teachers to acquire the information necessary to introduce instruction in agriculture into the common schools.

Hawaii College.—Willis T. Pope, professor of botany and horticulture, has been appointed by the governor superintendent of public instruction in the Territory.

Idaho University and Station.—The board of regents has authorized the establishment of a school of practical agriculture with a course of study to extend over three years, and with six months' instruction each year beginning about October 1. E. J. Iddings, assistant in animal husbandry in the Colorado College, has been appointed principal of the school and is to enter upon his duties August 1.

Several movable schools of agriculture are to be held during December and January for periods of two weeks each. The plan includes the holding of three of these schools simultaneously, so that the men drawn from college work may accomplish the most with the least possible traveling and loss of time. The appointment of three field men for extension work in horticulture and entomology, irrigation and general farming, and dairying, respectively, was also authorized.

C. C. Vincent, assistant horticulturist of the Oregon Station, has accepted an appointment as assistant in horticulture in the university and station.

Indiana Station.—Frank D. Kern, associate botanist, has been appointed a university fellow in botany at Columbia University for the ensuing year.

Massachusetts Station.—An appropriation has been made by the legislature of $15,000 for purchasing land and buildings in the cranberry district and the equipment and maintenance of a substation in the interests of cranberry growers. Dr. H. J. Franklin is to be in local charge of the substation.

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INDEX OF SUBJECTS.

NOTE.—The abbreviations "Ala. College," "Conn. State," "Mass.", etc., after entries refer to the publications of the respective experiment stations; "Alaska," "Hawaii," and "P.R." to those of the experiment stations in Alaska, Hawaii, and Porto Rico; "Can." to those of the experiment stations in Canada, and "U.S.D.A." to those of this Department.

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U. S. DEPARTMENT OF AGRICULTURE

OFFICE OF EXPERIMENT STATIONS

A. C. TRUE, DIRECTOR

Vol. XXII MAY, 1910 No. 6

EXPERIMENT STATION RECORD

WASHINGTON
GOVERNMENT PRINTING OFFICE
1910

U. S. DEPARTMENT OF AGRICULTURE.

Scientific Bureaus.

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BUREAU OF ANIMAL INDUSTRY—A. D. Melvin, *Chief.*
BUREAU OF PLANT INDUSTRY—B. T. Galloway, *Chief.*
FOREST SERVICE—H. S. Graves, *Forester.*
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BUREAU OF STATISTICS—V. H. Olmsted, *Statistician.*
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OFFICE OF EXPERIMENT STATIONS—A. C. True, *Director.*

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Canebrake Station: *Uniontown;* F. D. Stevens.[a]
Tuskegee Station: *Tuskegee Institute;* G. W. Carver.[a]
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ARKANSAS—*Fayetteville:* C. F. Adams.[a]
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GUAM—*Agaña:* J. B. Thompson.[b]
HAWAII—
Federal Station: *Honolulu;* E. V. Wilcox.[b]
Sugar Planters' Station: *Honolulu;* C. F. Eckart.[a]
IDAHO—*Moscow:* E. E. Elliott.[c]
ILLINOIS—*Urbana:* E. Davenport.[a]
INDIANA—*Lafayette:* A. Goss.[a]
IOWA—*Ames:* C. F. Curtiss.[a]
KANSAS—*Manhattan:* E. H. Webster.[a]
KENTUCKY—*Lexington:* M. A. Scovell.[a]
LOUISIANA—
State Station: *Baton Rouge;*
Sugar Station: *Audubon Park, New Orleans;*
North La. Station: *Calhoun;* } W. R. Dodson.[a]
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MASSACHUSETTS—*Amherst:* W. P. Brooks.[a]
MICHIGAN—*East Lansing:* R. S. Shaw.[a]
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MISSOURI—
College Station: *Columbia:* F. B. Mumford.[a]
Fruit Station: *Mountain Grove;* Paul Evans.[a]
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Cornell Station: *Ithaca;* H. J. Webber.[c]
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College Station: *West Raleigh;* C. B. Williams.[a]
State Station: *Raleigh;* B. W. Kilgore.[a]
NORTH DAKOTA—*Agricultural College:* J. H. Worst.[a]
OHIO—*Wooster:* C. E. Thorne.[a]
OKLAHOMA—*Stillwater:* John A. Craig.[a]
OREGON—*Corvallis:* J. Withycombe.[a]
PENNSYLVANIA—
State College: T. F. Hunt.[a]
State College: Institute of Animal Nutrition, H. P. Armsby.[a]
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Norfolk: Truck Station, T. C. Johnson.[a]
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WISCONSIN—*Madison:* H. L. Russell.[a]
WYOMING—*Laramie:* J. D. Towar.[a]

[a] Director. [b] Special agent in charge. [c] Acting director.

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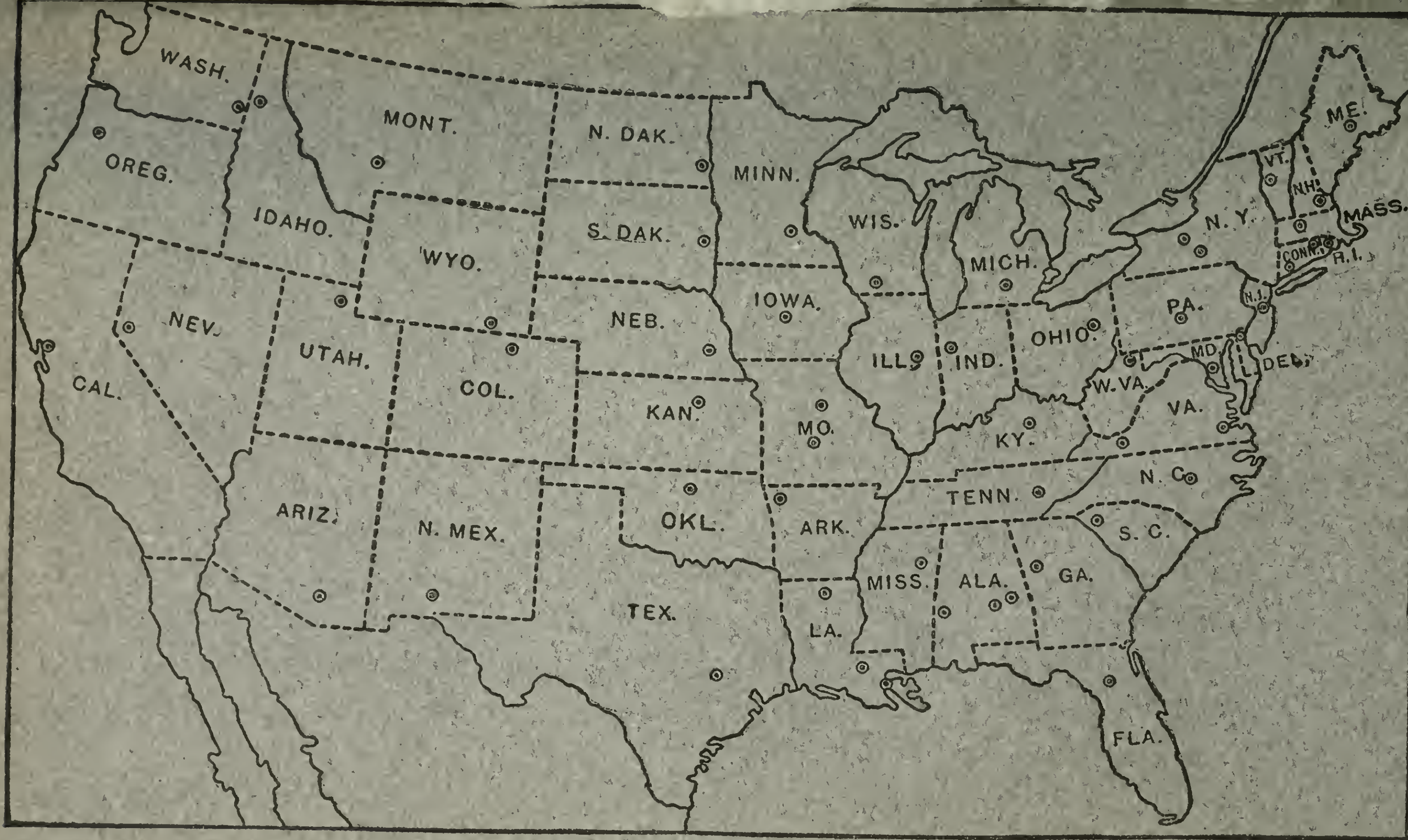

THE AGRICULTURAL EXPERIMENT STATIONS OF THE UNITED STATES.